THE IRON TRADE REVIEW

VOLUME XXXV CLEVELAND, OHIO, AUGUST 28, 1902 NUMBER 35

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Comparative quietness has come upon the iron trade in the last week in August—a condition in sharp contrast with the first half of the month. The coke supply has improved slightly in some spots, but with other consumers the liability to sudden stoppage is as great as at any time last week. It is evident that there can be no increase in the supply of domestic pig iron, but rather a tendency the other way, while the supply of cars and particularly locomotives continues to be so inadequate to meet the needs of coke producers. Not until navigation closes is there any likelihood that railroads will be freer in this regard. In the past two days Mahoning and Shenango Valley furnaces that were banked one week ago have had a better supply of coke, but several are still banked. The tendency in foundry iron is unmistakably upward, and the movement is more marked because of the refusal of some producers, particularly Southern, to quote for any delivery in 1903. Meantime $18 Birmingham is the usual quotation for No. 2, though there have been sales as high as $20. Northern furnaces have been beset the past week by foundry customers to whom the banking of a furnace means the suspension of melting. Foundries are also suffering for lack of coke. Thus the inability of the railroads to move the freight offered affects a diversity of iron consuming interests. For many weeks it is likely that the fuel question will be the uppermost one in all departments of the trade. The effect of the anthracite strike is cumulative, and it may be months before it ceases to be felt in the iron industry. Contracts now being placed for next year are from a variety of smaller consumers. The supply of charcoal iron will be increased in the near future by the starting up of three Michigan furnaces that have been inactive for several years. In the Pittsburg district it is reported that the producers of Virginia basic iron have made tenders of iron for shipment late this year at $21.50 to $21.75 and for the future at $20.50 to $20.75. Foreign iron, Bessemer, foundry and basic, is coming in at an increasing rate and quotations for Middlesboro iron at Atlantic seaboard are as low as $19, duty paid, for No. 3. Cargo lots of Middlesboro iron have been offered at $21 a ton, Pittsburg. The decline in foreign steel has led to waiting by some buyers. German billets can be bought at $30, duty paid, as against $32 and $33 for domestic steel. German ferro-manganese has been offered in this country at $51.50. The finished material market is rather dull. Some rail tonnage is still being placed, the mills booking about 50,000 tons the past week, including an order from the Wabash Railroad for 25,000 tons. In the Chicago district quite a number of structural orders are pending and some German material has been placed in that market, and an Eastern shipbuilding company has placed a round order for plates and shapes abroad. One large plate mill is sold ahead to the middle of 1903. The bar trade is fairly active considering the tonnage heretofore placed, and it is noticeable that manufacturers rather than jobbers are buying now. In the Chicago district one mill reports sales of 6,000 tons for the past week. Generally the basis of 1.95c Chicago for iron is being maintained, but a few mills not well supplied for the near future are making slight concessions to keep going, and some of their quotations have extended to Central Western points.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, August 27.

Few of the furnace companies in the Mahoning and Shenango Valleys succeeded in operating their stacks during the past week, without being compelled to bank for brief periods. The coke situation is the worst the furnace operators ever had to contend with, and while deliveries have been better in the past few days there is no assurance of a large and steady forward movement of coke from the Connellsville region owing to the congested condition of the railroad yards in this district. Nor were the furnaces in the Valleys the only sufferers, as nearly every stack in this district was affected to some extent, and at none are the stocks large enough to insure steady operation for even a few days, should shipments be interfered with again. The railroads are not entirely at fault, as it has been stated that the shipments west from the Connellsville region have not been nearly so heavy for the past ten days as the demand requires, despite the fact that the production is heavier than at any previous time in the history of the region. The production of all grades of iron, especially Bessemer, is being greatly curtailed and operators having small lots for fourth quarter shipment are already asking $21.50 to $21.75 at the furnace.

Until the railroad terminals in this district are practically doubled there will be a constant delay in forwarding material from the iron and steel plants and coal and coke from the Connellsville region. The Wabash railroad will afford considerable relief, but the road into this city cannot possibly be placed in operation in less than a year. Both the Pennsylvania and Lake Erie railroads have plans under contemplation for extending their terminals and yard facilities, but should work be commenced at once it would be many months before the effects would be felt.

The pig iron market has been very quiet during the week sales being limited almost entirely to carload lots for prompt delivery. Thus far there has been practically no buying whatever of the Middlesborough foundry iron that is being offered here, the foundrymen preferring to pay the higher prices asked for the domestic irons as long as they can be obtained. Much of the English iron that is being offered is being resold by Eastern consumers who were compelled to purchase cargo lots owing to the almost prohibitive freight rates on smaller quantities. Prompt shipment is promised on cargo lots at $21.50, delivered, Pittsburg. Despite the recent advances in the English pig iron market cargo lots of Middlesborough iron can be laid down in Pittsburg at $21 per ton.

The Wabash Railroad last week placed an order for 25,000 tons of rails for delivery next year which will be rolled at the Edgar Thomson works. Other orders have also been closed by the rail mills during the week bringing the total tonnage up to 50,000. In other finished lines the market is quiet and steel bars, except in very small lots, can be obtained for delivery within 60 days at the agreement quotations, no more premiums being asked. A small tonnage of plates and structural shapes for delivery next year was also placed during the week. The market for wire products is somewhat better than it has been for some time, and the indications are that the demand during the next three months will be very heavy. A number of the independent mills that have been closed for several months are making repairs and will resume operations within the next ten days.

PIG IRON.—The market has been comparatively quiet during the past week, there being no buying whatever of the various foundry grades for delivery the first half of next year. Northern No. 2 in carload lots has been sold during the week at $25 a ton for prompt shipment. There is practically no demand

for Bessemer iron either for prompt or forward shipment, but owing to the curtailment of the production of this grade, due to the banking of the furnaces, the operators having small lots for delivery the fourth quarter of this year are now asking from $21.50 to $21.75 per ton, at the furnace. Virginia furnaces have practically glutted this market with offerings of basic iron and large lots for future delivery can be had at $20.50 to $20.75, delivered, Pittsburg. The forge iron market has also been very quiet. We revise quotations as follows:

Bessemer, Valley	$21 00 to 21 75
Bessemer, Pittsburg	21 75 to 22 50
No. 1 Foundry	24 50 to 25 50
No. 2 Foundry	24 00 to 25 00
No. 3 Foundry	22 00 to 23 00
Gray Forge, Pittsburg	21 75 to 22 00
Chilled Basic, Valley	20 75 to 21 00
Chilled Basic, Pittsburg	21 50 to 21 75

STEEL.—Although German steel has steadily declined in price during the past three weeks, there has been no demand for this material in this district, consumers believing that still lower prices will prevail. German billets are now being freely offered here at $30 per ton; domestic billets are held at $32 for Bessemer, while open-hearth billets are quoted at $33. Wire rods are quoted $36 to $37, according to the delivery.

FERRO-MANGANESE.—The market continues quiet with no change in the quotations. Domestic 80 percent is held nominally at $52.50 per ton, delivered at buyer's mill, and the English product is held at about the same price. German manganese is offered here at $51.50.

MUCK BAR.—The market is quiet but firm, and the last sales made were on a basis of $36.50 per ton.

SKELP.—The demand for both iron and steel skelp is not very heavy, and we quote both grooved and sheared iron skelp at 2.10c to 2.12½c while steel skelp is held at 2.20c.

SPELTER.—The market continues strong and we quote prime western grades at 5.35c to 5.38½c, delivered, Pittsburg.

RAILS AND TRACK MATERIAL.—The Wabash Railroad placed a contract for 25,000 tons of rails with the Carnegie Steel Co. during the week, for delivery next year. Other roads also closed small contracts for next year's delivery, and fully 50,000 tons have been taken by the rail mills during the past few days. Our quotations remain unchanged as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $46; 12 pounds, $44; 16 pounds, $42; 20 pounds, $40; 25 to 40 pounds, $38 to $40. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—A fair tonnage of plates for delivery next year was closed during the past week at agreed quotations. For delivery during the months of November and December the plate mills are securing from 1.85c to 2c. The following quotations are made on deliveries during 1903: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plate more than 100 inches wide, 5c extra 100 pounds. Plate 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

BARS.—Despite the fact that some of the bar mills in this district have been shut down for brief periods during the summer on account of the scarcity of billets, the mills are gaining on their orders and except on very small orders the agreement quotations are now being named, no more premiums being asked. We make the following quotations: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.80c to 1.90c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2.25c and upwards.

PIPES AND TUBES.—The market continues strong and there is a very pronounced scarcity of merchant pipe, few of the jobbers having large lots on their hands. Quotations to jobbers in carload lots, with freight added to destination, are as follows:

MERCHANT PIPE.

	Black Percent.	Galv. Percent.
⅛ to ½ and 11 to 12 inches	60	48
¾ to 12 inches	67	55

BOILER TUBES.

Steel.

	Percent.
1 to 1½ inches	45
2¼ to 5 inches	62½
1¾ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	42½
2¼ to 5 inches	50
1¾ to 2¼ and 6 to 13 inches	40

CASING.

	S. and S. Percent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

SHEETS.—The demand for the heavier gauges of sheets continues strong, while inquiries for sheets for delivery during the next 60 days are reported very heavy. Few of the sheet mills have large stocks on hand and it is probable that a number of the mills of the American Sheet Steel Co. that are closed will resume operations shortly. Our quotations from jobbers in small lots are as follows: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.45c for Nos. 18 to 21, 4.20c for No. 27, and 4.50c for No. 28. Galvanized sheets, mill shipments in carload lots to consumers are as follows: Nos. 10 and 11, 3.05c; Nos. 12 to 14, 3.15c; Nos. 15 to 17, 3.25c; Nos. 18 to 21, 3.45c; Nos. 22 to 24, 3.75c; Nos. 25 and 26, 4c; No. 27, 4.25c; No. 28, 4.50c.

MERCHANT STEEL.—The market continues firm at unchanged prices, the demand for shafting being still very heavy. We quote turned cold rolled ground shafting in carload lots 47 off, and in less than carload lots, 42 off; tire steel, 2.25c to 2.30c; toe calk, 2.35c to 2.45c; sleigh shoes, 2.25c to 2.35c; machinery steel, 1.70c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

WIRE AND WIRE NAILS.—A number of the mills that have been closed during the summer months are preparing for an early resumption and there is every indication that the fall demand for wire products will be very large. We make the following quotations: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire, $2.40 in carload lots; polished staples, $2.20, and galvanized staples, $2.60; painted barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

OLD MATERIAL.—The market is comparatively quiet, the dealers holding their material at prices that are almost prohibitive to the consumers. Small transactions are reported, the foundry interests being the largest buyers. We note the sale of 100 tons of low phosphorus melting stock at $24.50 per gross tons and 500 tons of ordinary heavy melting stock at $21.50, gross ton. Our quotations, gross tons, are as follows: Cast scrap, $19 to $19.50; heavy melting stock, $21 to $21.50; No. 1 wrought scrap, $22 to $22.25; steel rails for rerolling purposes, $23; car wheels, $21.25 to $21.50; borings, $10.50 to $11; turnings, $10.50 to $11.

COKE.—For the week ending Saturday, Aug. 16, the total production of the upper Connellsville region is estimated at 251,346 tons by the Connellsville *Courier*. The production of the lower region for the same period is estimated at 42,255 tons. The production of the entire Connellsville region is much heavier than ever before, but despite this the furnaces west of the region are suffering for want of coke. For prompt shipment furnace coke again commands from $3.75 to $4 per ton. Foundry coke is held at $2.75 to $3.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, August 26.

The scarcity of coke continues to be the absorbing question to consumers in this section. While no more furnaces are reported as having gone out of blast, nearly all are depending

upon their day-to-day receipts to keep in operation. Few furnaces are working to their full capacity. Many foundries have been caught short, and these are paying from $8 to $8.50 for such coke as they can get for spot shipment. Very little is to be obtained, however, even at this price, as there is little offered for sale in any part of the country. Transactions in pig iron and finished material have not been active during the past week. All the large sellers of the former material have withdrawn from the market, and the big consumers of finished iron and steel have generally covered for their wants. Such buying as is being done comes from those who have found that their requirements will exceed the tonnages in their contracts. Prices of pig iron continue to advance, spot shipments being quoted at $25.65 to $26.15 for No. 2 foundry.

Pig Iron.—Outside of that offered for prompt delivery, very little iron has been sold in this city during the past week. This is not because of any falling off in the demand, but entirely from the fact that with but few exceptions all the furnaces selling in this district have withdrawn from the market. These include the Tennessee, Sloss and Virginia furnace companies. One Northern furnace has a limited tonnage to sell for delivery in the second quarter of next year, and it is reported that a few Southern furnaces are offering small lots for delivery after April 1 next on the basis of $20 Birmingham. The demand for spot iron shows no signs of abatement, but on the contrary grows in strength in proportion to the decrease in the amount of iron that is offered. No. 2 foundry for immediate delivery is quoted at $25.65 to $26.15. The scarcity of coke adds fresh difficulties to the local situation since many furnaces are affected by it and the supply of iron thereby curtailed. The sales of foreign iron are growing, British iron being offered at $25.50 delivered. We have revised our quotations on Southern iron, as follows:

Lake Superior Charcoal	$27 00 to 28 00
Local Coke Foundry No. 1	24 00 to 25 00
Local Coke Foundry No. 2	23 75 to 24 25
Local Coke Foundry No. 3	23 25 to 23 75
Local Scotch Foundry No. 1	23 50 to 24 50
Local Scotch Foundry No. 2	23 00 to 24 00
Southern Coke No. 1	23 15 to 23 65
Southern Coke No. 2	22 65 to 23 15
Southern Coke No. 3	22 15 to 22 65
Southern Coke No. 4	21 65 to 22 15
Southern No. 1, soft	23 15 to 23 65
Southern No. 2, soft	22 65 to 23 15
Southern Gray Forge	20 65 to 21 15
Southern Silveries	23 65 to 24 15
Jackson Co. Silveries	28 00 to 29 00
Ohio Strong Softeners	25 60 to 26 10
Alabama Car Wheel	26 65 to 27 10
Malleable Bessemer	24 00 to 25 00

The freight rate from Birmingham to Chicago, which is $3.65, is included in the above quotations, though all iron for next year's delivery is being sold f. o. b. at the furnace.

Bars.—Considerable new business continues to be offered mills, chiefly by the manufacturing trade, one mill reporting sales in the past week amounting to over 6,000 tons. All the large mills are holding the price of iron firmly at 1.95c, the only cutting being done by such concerns as are short on orders for nearby deliveries. There is not much demand for steel bars. We quote Chicago delivery Bessemer steel, 1.75c to 1.85c; angles, less than 3x3, 1.85c; iron, 1.95c; hoops, 2.15c. Prices for prompt delivery and out of store, steel, 2c to 2.10c; iron, 2.20c to 2.25c; hoops, 2.40c to 2.45c; angles, 2.50c to 2.60c.

Sheets.—Demand for light gauges is light in comparison with the sales of heavier gauges. Mills report that their books are well filled on the latter sizes, and that they cannot give delivery within three or four months. We quote No. 27 black, Chicago delivery, 3.15c to 3.25c; galvanized, 4.40c to 4.45c; out of store, No. 27 black, 3.35c to 3.50c; galvanized, 4.60c to 4.75c.

Structural Material.—There are quite a number of orders pending, aggregating a large tonnage. Mills expect to close these this coming week. A small amount of German material has been sold in the week. We quote mill prices as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.85c; angles, channels and tees, smaller than 3 inches, 1.85c base; plates, 1.75c. Prices on lots from store are based on the necessities of buyers and according to the size of order. Store prices vary from 2½ to 4 cents a pound.

Billets.—German billets to the amount of 2,000 tons or thereabouts have been sold in the past week, delivered price being $31.50 based on sizes averaging 4x4. Domestic open-hearth forging billets are quoted at $38 to $40.

Rails and Track Supplies.—Eastern mills report sales during the week of 15,000 tons of standard sections to a Western railroad; 10,000 tons to another, and smaller lots to other roads. Light rails are in active demand, particularly for prompt delivery. Track supplies are moving in proportion with the sales of heavy rails, one local manufacturer having orders on its books for next year's delivery for 200,000 kegs of spikes. Bolts, nuts and angles cannot be had for delivery within four to six months. We quote heavy sections, $28; second quality, $27; light rails, 45 pounds, $34 to $35; 12 pounds, $40 to $41, with regular differentials for intermediate sizes; out of store, $45 to $50; splice bars, 2.25c; spikes, carload lots, 2.45c to 2.55c; track bolts 3½x¾, with square nuts, 3.05c per 100 pounds; with hexagon nuts, 3.20c with usual differentials for other sizes.

Merchant Steel.—Mills are still out of the market, and the only trading in this material is being done through jobbers. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.65c to 2.75c; sleigh shoe, 1.75c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 percent to 10 percent higher; cold rolled shafting, carload lots, 50 percent off, Chicago; less than carload lots, 45 percent off, Chicago.

Cast Iron Pipe.—In sympathy with the condition of the pig iron market, prices of this material continue to stiffen. Buying is not heavy and is confined to small lots. We quote 4-inch water pipe Chicago delivery, $36.00; 6-inch and larger, $34; gas pipe, $1 a ton higher.

Merchant Pipe.—There is little improvement in the demand, though the market remains firm. Jobbers report that a fair business has been done in small lots. Prices are as follows:

MERCHANT PIPE, RANDOM LENGTHS.

(Jobbers, Chicago Basing Discounts.)

	Black Percent.	Galv. Percent.
⅛ to ½ in. inclusive	58½	46½
¾ to 12 in. inclusive	65½	53½
(Consumers, Chicago Basing Discounts.)		
⅛ to ½ in. inclusive	56½	43½
¾ to 12 in. inclusive	63½	50½

BOILER TUBES.

Steel.

	Percent.
1 to 1½ in	55
1¾ to 2½ in	45
2¾ to 5 in	55
6 to 13 in	47½

Iron.

	Percent.
1 to 1½ in	55
1¾ to 2½ in	32½
2¾ to 5 in	42½

Plates.—An active demand prevails for plates of light gauges. The leading local manufacturer still remains out of the market for this year's delivery, and is refusing orders for next year. We quote mill prices, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c to 2.15c; flange steel, ¼-inch and heavier, 1.85c to 2.25c; from stock, tank steel, ¼-inch and heavier, 2.30c to 2.50c; 3-16, 2.40c to 2.60c; No. 8, 2.45c to 2.65c; flange steel, 2.50c to 2.60c.

Wire and Wire Nails.—The large jobbers are beginning to send in their fall orders and on barb and smooth wire and wire nails the week's transactions aggregate a large tonnage. Manufacturers of wire products are also buying heavily at the present time. Prices to jobbers are as follows: Smooth wire, carload lots, $2.10; painted barb wire, $2.70; galvanized barb wire, $3; wire nails, $2.15; staples, $2.25. Retailers' prices, five cents higher than above.

Coke.—There is little change in the local situation from that reported last week. All the furnaces in this locality are reported short, and none are running to their full capacity. Spot coke commands from $8 to $8.50 a ton. For future delivery, we quote 72-hour Connellsville foundry $6 to $6.50; Virginia and West Virginia, $5.75 to $6.

Old Material.—While dealers are holding prices firmly at present quotations, little buying is being done by mills, though some are making inquiries for fall deliveries. There is a

heavy demand for all kinds of cast scrap, the price of which continues to move upward in sympathy with that for pig iron. We quote as follows:

Relaying rails	31 00 to 32 00
Old wheels	20 00 to 21 00
Heavy melting steel	17 25 to 17 50
Mixed country steel	14 50 to 15 00

The following are selling prices per net ton:

No. 1 R. F. wrought	$20 50 to 21 00
No. 2 R. F. wrought	18 50 to 19 00
Dealers' forge	15 50 to 16 00
No. 1 busheling	15 00 to 15 50
No. 1 R. R. and Machine Cast	15 50 to 16 00
Railway malleable	15 50 to 16 50
Country malleable	15 00 to 15 50
Iron axles	24 00 to 24 50
Steel axles	20 50 to 21 00
Cast borings	10 00 to 10 50
Wrought turnings	14 00 to 14 50
Iron axle turnings	14 50 to 15 00
Steel axle turnings	13 50 to 14 50
Stove plates	11 50 to 12 00
Old iron splice bars	20 50 to 21 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*, 1064 ROSE BUILDING, Aug. 27.

Prices of non-Bessemer ore have advanced from 50 to 75 cents per ton and an advance in Bessemer ore is expected. Sales are not large, but there is a fair demand for this time of the year. It is expected that the shipments of ore for August will be about 4,000,000 tons. Dispatch at present is slow. The secretary of the Lake Seamen's Union has announced that beginning Sept. 1 wages will be generally advanced on vessels all over the lakes. The demands of the men will be granted. As predicted last week, the rate of 80 cents from upper lake ports has not been established by vessel men, but the 60-cent rate from Escanaba is maintained.

PIG IRON.—The one topic of discussion among furnace men and dealers in pig iron is the scarcity of coke. While Cleveland furnaces have not been compelled to bank, those in this city like most of the valley furnaces are living from hand to mouth, not knowing from day to day whether a sufficient supply of coke can be obtained. Increased interest is felt in this section in the anthracite strike, which is blamed to a large extent for the coke famine. Several Southern furnaces represented in Cleveland are not trying to sell all of their product for the first half of next year, but are holding back on account of uncertainty as to the cost of labor. A fair amount of business has been done during the week for first half of next year. We quote prices as follows, the figures on foundry iron being for shipment in the first half of 1903:

Bessemer	$21 75 to 22 25
No. 1 Strong Foundry	23 00 to 23 50
No. 2 Strong Foundry	22 50 to 23 00
No. 3 Foundry	21 75 to 22 25
Scotch No. 1	23 00 to 23 50
Scotch No. 2	22 50 to 23 00
Gray forge, Valley	20 50 to 20 75
Lake Superior Charcoal	25 00 to 26 00

FINISHED MATERIAL.—There was a very noticeable diminution in business in finished material during the week. There was no weakness or inclination toward a break in prices, and the change in conditions was regarded as a favorable sign, as it has been recognized for some time that the rush to purchase far into next year might not be founded on wisdom Present high prices are certain to check to some extent the use of iron and steel in buildings. This tendency has been manifested lately, as for example, in a large building soon to be erected by a Cleveland firm. The original plan called for a structure almost entirely of steel, but the cost was found so great that the plan has been revised, so that comparatively little steel will be used. It cannot be said, however, that there is any general indication of decreased consumption of iron and steel. There has been some talk within a few days of the building of more ships, dependent on the price of steel. Prices of tank steel range from 1.70c to 1.85c Cleveland. The base price for bar iron is 1.80c Pittsburg. Sales have been made, however, at 1.90c Pittsburg within a few days. On the other hand, independent mills farther west have offered Cleveland jobbers the smaller sizes of bar iron at less than prevailing prices. Sales out of store, Cleveland, are on a basis of 1.90c to 2c for iron and steel. We quote steel bars at 1.60c for Bessemer and 1.70c for open-hearth, Pittsburg. There is no change in sheets, which are weak, as is also wire. We quote 2.10c to 2.15c Cleveland for 3-16-inch sheets and heavier. Cleveland prices are on the following basis on mill sales of black sheets: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c, for one pass cold rolled. On galvanized sheets Cleveland prices to consumers are as follows for carload lots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.53c; No. 28, 4.60c. We continue to quote 1.70c Cleveland for beams and channels for delivery in 1903, business for 1902 being through jobbers at prices from 2½ to 3½c according to sizes and quantity.

OLD MATERIAL.—A fair business is being done in old material in small lots, but no big deals are being made. Heavy steel is a shade weaker. We revise Cleveland prices, all gross tons, as follows:

Old iron rails	$25 50 to 26 50
Old steel rails (6 ft. and over)	22 00 to 23 00
Old steel rails (6 ft. and under)	21 00 to 22 00
Old car wheels	20 00 to 21 00
No. 1 R. R. wrought scrap	22 00 to 23 00
Mill scrap	19 50 to 20 50
No. 1 machine cast scrap	18 00 to 19 00
Iron axles	28 00 to 29 00
Steel axles	27 00 to 28 00
Axle turnings	18 00 to 18 50
Wrought turnings (free from cast)	15 50 to 16 00
Cast borings	11 00 to 11 50
Uncut wrought iron boilers	12 00 to 13 00
Steel boiler plates	17 00 to 18 00
Grate bars	12 00 to 13 00
Pipes and flues (clean)	17 50 to 18 50
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50
Sheet iron	11 50 to 12 00
Wrought drillings	15 00 to 16 00
Malleable iron (railroad)	20 00 to 20 50
Malleable iron (agriculture)	17 50 to 18 00
Stove plate	13 00 to 14 00
Heavy steel	18 50 to 19 50

CINCINNATI.

August 26.

It is a hard matter to say anything definite in regard to the pig iron business. There is little iron offering even for the first half of the coming year and prices on this little are about as different as they could be to apply to the same article. Inquiries as to what sort of prices to quote on iron have brought a variety of answers. "Make your own prices," replied one important agent in reply to an inquiry. "There will be nobody to dispute any price that you might say." Another said, "What is the use of quoting prices on Southern iron when there is none to sell?" All branches of the iron trade are doing very well as far as the demand is concerned. The manufacturers who are in need of finished material of all kinds are now buying more liberally and are promising that when the first of the month is reached they will be in the market for even larger amounts. Structural iron dealers are booking orders for next year without stint.

There has been a good deal of interest during the week in the action of the iron molders in securing and ratifying an advance in the wages of bench and floor molders. The first demand was for a uniform rate of $3.10 per day, but it was modified to $2.90 per day for bench molders and $3 a day for floor molders. The new rate was put into effect as from Aug. 1 and will continue for a year.

PIG IRON.—There has been but a small amount of business in Southern irons in this market during the past week. The iron handlers have contented themselves with supplying small amounts of mill iron and bringing foreign iron as far West as Detroit and Chicago, one Cincinnati agent having made transactions involving considerable of this foreign iron for delivery at the points named. There has been a large amount of complaining on the part of customers over slow deliveries on old contracts. Several concerns have been compelled to shut down and others are on the eve of doing the same. It is a problem what to do. There is no spot iron to offer on new contracts even and when it is impossible to make deliveries on old contracts consumers who are not protected have to do without or make the best of it.

One of the largest Southern producers is out of the market entirely for the first half of 1903. He has no iron to offer short of July 1. Another has nothing to sell at a price lower than $19. Some of the smaller furnaces have iron that they are selling at any price that happens to strike the managers when an inquiry is made. An example of the utter disregard of prices is shown in the fact that foreign iron is being shipped

by rail to Chicago when by taking a little more time it could be carried by lake at a lower rate. One furnace in the South offered a batch of No. 1 foundry at $19 Birmingham. On the other hand a second furnace not far from the first has offered No. 2 at $20 Birmingham. Iron for immediate delivery will bring any price asked. One agent stated that **$25 to $26** would be a fair price to quote for No. 2 at Cincinnati. As near as anybody can come to quoting prices ruling at Cincinnati, they are as follows:

Southern Foundry No. 1	$22 25 to 23 00
Southern Foundry No. 2	21 75 to 22 50
Southern Foundry No. 3	21 25 to 22 00
Southern Foundry No. 4	20 75 to 21 50
Southern Foundry No. 1, soft	22 25 to 23 00
Southern Foundry No. 2, soft	21 75 to 22 50
Gray Forge	21 00 to 22 00
Northern Foundry No. 1	26 10 to 26 60
Northern Foundry No. 2	25 10 to 26 10
Southern C. W. iron	27 00 to 28 00
Malleable coke iron	24 75 to 25 25

FINISHED MATERIAL.—Prices remain stationary on finished material and the demand is the same as it has been—fully up to the limit of what the mills are able to care for. Prices remain unchanged, bar iron being quoted at 1.92c and steels bars at 1.72c, both being quoted at 2.20c out of store. Angles are YW2.35c and 2.50c out of store. Sheets are quoted at 2.50c for No. 12 and 2.35c for No. 10.

OLD MATERIAL.—All the old material that is offered is taken up on short notice. There is a short supply, however, and it is likely that the market will stiffen up considerably during the week. Prices are about as follows:

Old No. 1 Wrought Railroad, net tons	$20 75 to 21 25
Cast Machine and Foundry, net tons	14 75 to 15 75
Old Iron Rails, gross tons	25 00 to 26 00
Old Steel Rails, gross tons	24 00 to 25 00
Old Short Lengths, gross tons	17 75 to 18 25
Old Iron Axles, gross tons	27 00 to 28 00
Old Iron Car Wheels, gross tons	19 50 to 21 00
Stove Plates, gross tons	11 75 to 12 00
Wrought Turnings, net tons	14 50 to 15 50
Cast Borings, net tons	9 50 to 9 75

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO 150 NASSAU ST., August 26.

PIG IRON.—The situation in the anthracite region has received more attention during the past few days than at any time since the beginning of the strike, because of the famine aspect of the coke supply, and there are frequent reports of furnaces banking or about to bank in consequence. The Southern furnaces still refuse to book any orders for the first six months of 1903. This is especially true of the better grades of foundry pig. Sales of these have been in such large quantities that when the companies again open their books for the first six months of next year they will have very little to offer. One large interest will practically have none of the better grades to sell. Southern No. 2 is selling at $18, and from a reliable source it is reported that one company is getting even higher prices for some iron recently sold. Still there are some melters who report having purchased iron at $17.50. Foreign irons continue to be in excellent request. While the tonnage is conceded to be large, exaggerated and unfounded reports are promulgated. Prices give unmistakable evidences of stiffening. Some of the better Scotch brands have commanded as high at $25 and $26 per ton, New York delivery. Middlesboro irons are selling at $21.50 to $22, although some sales are noted at lower prices. Northern furnaces are practically out of the market for the early portion of next year, and while they are taking some orders the quantity represented is small. The sales made have been on the basis of $21 to $21.50 at furnace for No. 2, although for shipments this year $23 has been paid. Prices for New York delivery this year are quoted nominally as follows: No. 1X Northern, $23.50 to $25; No. 2X Northern, $22.75 to $23.50; No. 2 plain Northern, $22.25 to $22.50; No. 1 Foundry Southern, $22 to $23; No. 2 Foundry Southern, $21.75 to $22.50; No. 3 Foundry Southern, $21.25 to $22.75; No. 4 Foundry Southern, $20.25 to $21.25.

FINISHED IRON AND STEEL.—Representatives of mills report that orders for structural staples for delivery next year are being booked in large quantities. Those needing shapes for use in the near future are relying on foreign material, and some good sales of the latter have recently been made on a spot cash basis. Those who are not in a particular hurry can purchase domestic material at the pool price. Sheets continue the weakest feature of the finished material market. Jobbers say business is extremely dull, and as a result some of them, especially the small jobbers, are making sales at concessions from quoted prices. The demand for plates is still heavy, and high premiums are cheerfully paid for spot delivery. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.95c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.25c to 2.30c; firebox, 2.30c to 3.50c; refined iron bars, 1.95c to 2c; soft steel bars, 1.95c to 2.10c; steel sheets, in carloads, New York; No. 28, black, 3.18c to 3.25c; No. 28, galvanized, 70, 10 and 5 off.

PHILADELPHIA.

August 26

Large importations and the conservative policy of makers of iron has prevented rapid advances in prices, which might naturally have resulted from present conditions. The transportation outlook is serious, as not only the rolling stock but the trackage facilities are inadequate at most of the furnaces and rolling mills. Miles upon miles of loaded cars are waiting an opportunity to unload, and when crops begin to be moved, it is feared that confusion and delays will be worse than ever.

PIG IRON.—The situation is not improving, for the scarcity of iron for prompt delivery is greater than ever. Furnaces cannot get enough fuel to do economical work and many have suspended. Prospects of relief are very uncertain. Shipments from British ports are now received almost daily. Slight advances have been reported during the past week, but Middlesboro No. 3, in cargo lots, could be bought at about $19, c. i. f. duty paid. Small lots delivered in buyers' yards are quoted at $21 to $21.50. The general market may be quoted as follows: Deliveries in consumers' yards, $23.50 to $24 for No. 2 X foundry, covering the remainder of the year, $22.50 to $22.75 for the first quarter of 1903, and $22 to $22.50 for the first six months, and $21.50 to $21.75 for the last six months. Middlesboro iron in small lots, $21 to $21.50 spot delivery, or about $19.50 for shipments in cargo lots. Scotch irons for spot deliveries are quoted $23 to $24.

FINISHED MATERIAL.—The extraordinarily strong conditions of the pig iron market do not prevail in that for finished material. For prompt deliveries, local mills and importers quote from $2.25 to $2.50 for structural shapes, but the feeling is not quite as strong as it was some time ago. Plates are firm at the old figures of 2.05c to 2.10c. Seaboard or nearby points, and refined bar iron at $1.92c to 2c carload lots as minimum. Sheets are dull and inclined to shade off when strictly first-class orders are offered.

OLD MATERIAL.—Old material is steady at unchanged prices as follows: Old steel rails, $21.50 to $22; miscellaneous heavy steel scrap, $20.50 to $21; low phosphorus scrap, $27.50 to $28.25; old steel axles, $26.50 to $27.50; old iron axles, $29 to $30; old iron rails, $24 to $25; old car wheels, $20 to $21; choice scrap, R. R. No. 1, $23.50 to $24; country scrap, $18.50 to $19.50; machinery cast, $18.50 to $19.60; No. 2 light scrap (forge), $17 to $18; No. 2 light scrap (ordinary), $15 to $16; wrought turnings, $16 to $17; wrought turnings, choice heavy, $18 to $19; cast borings, $10 to $10.50; stove plate, $13.75 to $14.25.

It has been reported that the new crucible steel company which is being promoted by C. H. Halcomb, formerly president of the Crucible Steel Co. of America, will be located at Smokes Creek, near Buffalo, N. Y. The new company is to be capitalized at $1,000,000.

As noted in these columns last week the Pennsylvania Malleable Co., McKees Rocks, Pa., has decided upon the erection of a car wheel foundry, with a daily output of about 600 wheels. The foundry will be 300 feet long by 120 feet, and additional buildings will contain the power plant and cupolas. Two cupolas will be installed with a melting capacity of 15 tons an hour each. The capacity of the company's malleable plant is also to be increased from 50 to 75 tons daily. An addition is being added to the main foundry building 32x180 feet. The melting capacity is being increased by the erection of an additional open-hearth furnace. The car wheel plant will be completed early in December as work on the buildings has already been commenced.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON & STEEL PRESS CO.,

ROSE BUILDING, CLEVELAND, OHIO.

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PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St., D. C. WARREN, Manager.
THE CENTRAL WEST: R. A. EVANS, Manager.

Subscription, $3.00 per annum. To Foreign Countries, $4.00.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

AUGUST 28, 1902

THE JOBBER AND THE BAR MILLS.

Last February we adverted to the unsatisfactory position which the jobber in bars occupied as compared with his status in such products as sheets, tin plates and wire. There had been numerous complaints that the manufacturers of bars did not recognize the jobbing trade to the extent that they should, selling to consumers on the same terms as to jobbers in either large or small lots. A recognition of the justness of part, at least, of the claims of the jobbers came later on from the mills, when they established differentials on small lots specified of a given section. Lots of less than 2,000 pounds, but more than 1,000 pounds, in one size, irrespective, however, of length, carry now a differential of 10 cents a hundred pounds, and lots less than 1,000 pounds 30 cents.

Inquiry among the trade indicates that so far as the change goes it has worked very satisfactorily. While no distinction is made directly between a jobber and one who might be considered as his legitimate customer, the jobber who carries stocks can buy sizes without any differential, by taking at least a ton of a size, and can charge an advance to his customer who orders less than 2,000 or less than 1,000 pounds. The profit in such transactions is sufficient, but the fundamental difficulty remains that it contains no real recognition of the jobber. All, whether jobbers or not, are subjected to the same restrictions. While the condition of the trade has been improved from the jobber's standpoint, the real point at issue has not been touchced upon. The fact seems to be that protection to the jobber has been merely incidental, the mills placing a premium upon small lots of a size simply because they did not care for that kind of trade, from whatever source it came. A consumer can buy two tons of one size at a lower price than the jobber can buy several carloads, if his specifications cover a number of different sizes.

The principle has been clearly recognized by the sheet, tin plate and wire mills that the jobbing trade is *per se* entitled to certain encouragement. The bar manufacturers have not formally recognized any such principle. That they should do so is a statement which the jobber contends is not open to question. From the manufacturers' standpoint there is less question than there was that the jobber's place should be clearly defined and his rights recognized. The advent of the continuous mill, on which the great bulk of the steel bar tonnage is now rolled, makes the carrying of stocks much more necessary than it was, when the changing of rolls for a comparatively small tonnage was not such a matter of moment as it now is. Heavier stocks of steel bars must be carried than formerly. Small lots must be ordered from the jobber under present conditions because the mills have not the stocks. The scarcity throws trade to the jobber, and his main chance of securing a profit is to charge a higher price, which the scarcity of spot material makes obtainable. It is reasonable to assume that it is not fair that the jobber should only have this trade through the existence of artificial conditions. If he is called upon for material now that the mills cannot furnish expeditiously, his position should be so fixed with relation to the mills that it is clearly defined at all times, whether material is scarce or plenty. Nothing has been done in a rational manner towards fixing the boundaries of his sphere. What has been done, in the fixing of extras for small lots of a given size, is scarcely more than a makeshift, dictated partly by the convenience of the mills. There is room for further negotiation.

THE RAILROADS AND THE COKE SCARCITY.

Nearly a year ago the blast furnaces of the Mahoning and Shenango Valleys were confronted with what was practically a blockade of the railroads which carried their coke from the Connellsville region. The conditions were largely similar to those that have prevailed for the past fortnight, except that the delays in moving freight other than coke were worse than they have been of late. Last year the railroads assured shippers that the conditions were only temporary; that when the large orders for cars and locomotives which they had placed were filled there would be relief and they would be able to handle all the tonnage offered. Time has not proved the correctness of these promises. The blockade, so far as the movement of coke is concerned, has been as bad as it ever was. It is no justification of the existing condition to claim that more coke is being moved east than usual. Any extra demand from the East comes from a trade which the railroads do not usually have, and to which they have no business obligations of good treatment. The movement of coke from the Connellsville region to Pittsburg, the Valleys and more Western points is a regular trade which ordinary business principles dictate should be given preference. It is the fact, moreover, that for the Eastern movement of coke many cars and locomotives ordinarily employed for carrying anthracite coal are now being used, and rolling stock required for Western shipments should not be diverted to this use.

A large proportion of the main line track in Western and Southwestern Pennsylvania is hemmed in by rivers on one side and hills on the other. The building of additional tracks is expensive and railroad managers have felt so secure from competition on account of the

geography of the region that they have not felt called upon to increase their facilities. With the growth of the freight tonnage offered there is no question that main line track in Western and Southwestern Pennsylvania is entirely inadequate. Railroad after railroad has been planned to tap the Connellsville and other important sources of freight, to be either killed by natural or artificial obstacles, or bought off more or less openly by existing lines.

In view of these facts it is particularly gratifying to shippers to learn that there is not much question that the Wabash railroad proposes to gain an entrance into the Connellsville coke region. The difficulties are not insurmountable, and of the railroad's sincerity and earnestness there can be little question. Its efforts to gain an entrance into Pittsburg have been determined and untiring and the end has been so nearly gained that it is practically assured. It is to be hoped that the Connellsville region project will be pushed with equal vigor.

The conditions which have now existed for over a year in the Connellsville coke movement are simply intolerable, meaning as they do constant anxiety on the part of furnace managers and loss of vast sums of money. The loss of the two Valleys in a curtailment of production when consumers are clamoring for every ton of pig iron is but one element of the total loss. An important one is that one furnace, and probably several, that have run out of coke in the past week, being unable to stand banking, will have to be blown out and relined. One furnace in particular might have stood steady operation for several months, but could not stand banking. It is well known that towards the end of the life of a lining the product may be considerably larger than when the lining is new, owing to the greater furnace diameter, and the loss is therefore especially severe. That such losses are forced upon furnace owners through the failure of railroads to provide sufficient track, when this failure is due largely to their fancied security from new competition, is unbearable.

WHY THE TIN PLATE CONCESSIONS FAILED.

Inasmuch as the officers of the Amalgamated Association favorably recommended the proposed special wage scale for drawback tin plate to the members of the organization, and the *Amalgamated Journal*, the official organ, gave the plan kind treatment, it is reasonable to suppose that the management of the *Journal* would not print without comment a communication from a correspondent on the subject unless it was supposed not to misrepresent seriously the position of the rank and file of the members. Yet we find in last week's issue of the paper a letter from a Parkersburg worker who not only shows a foolish bias against any plan which might be agreeable to the manufacturers, but misstates some facts which should be matters of such common knowledge as not to be disputable. He says that "a paltry 1,500,000 boxes" is "about enough to run the trust mills six or eight weeks longer every year." Inasmuch as the output of the "trust" certainly does not at present exceed 7,000,000 boxes a year, and as the average of "six or eight weeks" is seven weeks, it follows that the mills of the "trust" are now running less than 33 weeks in the year, or 63 per cent. of the time, that being the time required to make 7,000,000 boxes, if 1,500,000 boxes are made in seven weeks. If such were really the case, this workman should have found ample reason for supporting some movement for an improvement.

Further on he endeavors to make the point that there is no guarantee that the Welsh workmen would not make a similar reduction, and thus take the trade back. Welsh wages are much lower than American wages, or this subject would never have had to come up. The roller, catcher, doubler, heater and shearman in Wales receive about $4.65 a ton. The present American scale pays $11.56. A reduction of 25 percent on the latter would be equal to 62 percent of the Welsh wages. Certainly the Welsh workmen, who have been continually striking for such trifles as 5 and 10 percent advances, would not submit to any 62 percent reduction. Nor is this all. American workmen were asked to stand but a portion of the reduced production cost required. Various supplies were to be had at special figures, and Welsh manufacturers could not get such concessions.

In another place the *Journal's* correspondent assumes that Welsh plates are selling at $2.52 a box for the rebate trade, and inquires if a cut in wages can go far to make up this difference. As a matter of fact the market price of such tin plate is just about $3.40 in New York for 100-lb. plates, and considerably more in Chicago.

If the letter we refer to represents in any degree the amount of information which the members of the Amelgamated Association brought to bear upon the consideration of the question submitted to them, it is by no means surprising that they were not in position to judge rightly.

The Zenith Furnace Co.'s stack at West Duluth, Minn., was put in blast Aug. 24 after repairs by the new company. The product is sold ahead to the middle of 1903. Pickands, Brown & Co., of Chicago, are sales agents, and with them Duluth, Pittsburg and New York men are interested in the company.

The blooming mill engine at the plant of the National Steel Co., Sharon, Pa., broke down this week, completely tying up the mill. The steel making department will continue in operation despite the fact that the blooming mill will be shut down for several weeks.

The Mutual Electric & Machine Co., Wheeling, W. Va., has been incorporated, authorized capital stock $25,000, by H. S. Sands, H. M. Kirk, H. E. Hoffman, and James W. Ewing, of Wheeling, and W. D. Graves, of Cleveland, O.

The American Anchor & Foundry Co., of Lima, O., capital $10,000, was incorporated by Jesse L. Smith, H. S. Moulton, T. A. Robinson, W. H. Woolery and O. F. Ramsayer.

The rolling mills of the Republic Iron & Steel Co., at Toledo, will be re-opened next Tuesday, Sept. 2, with a working force of about 350 men. The mills have been idle for nearly two months, during which time extensive improvements have been made.

Remarkable speed was made in the erection of the new plant of the Alliance Machine Co., Alliance, O. The foundations of the buildings were commenced April 10 last and the steel structural work was completed on June 18. On June 24 the plant was placed in operation single turn and on July 20 the plant was placed on double turn. The first machinery was shipped on August 11. At present 300 men are employed, but owing to the big demand for the company's products fully 100 men will be added within the next two months. The product of the plant consists of electric traveling cranes, rolling mill and special machinery, hydraulic riveters, flangers, presses and punches.

INDUSTRIAL NOTES.

Laboring men of Chicago propose to have a "Newport" of their own near Marinette, Wis. Led by the Machinists' Union, of Chicago, prominent leaders have secured an option on 3,000 acres of land and propose to turn it into a summer resort—a place where life in the open air can be enjoyed at a minimum expense. The property the committee of machinists has in view is rich in woodland scenery and vistas of lake and stream. Brook trout abound in the creeks, and the forest and fields offer opportunities for excellent shooting in season. Negotiations are said to be practically completed and the land will soon be transferred to a co-operative corporation.

The plate mill department of the Birmingham Rolling Mills, operated by the Republic Iron & Steel Co., after undergoing heavy repairing for six weeks, has resumed operations.

The National Malleable Casting Co., now located at Rockwell and West 26th Sts., Chicago, has purchased 20 acres at 46th Ave. and 22d St., for $30,000. The plant of the company is to be removed to the new site.

A six-masted steel schooner—the third and largest six-master ever built and the first six-master and second schooner ever constructed of steel—is to be added to the fleet managed by Capt. John G. Crowley, the contract for its building having been signed with the Fore River Ship & Engine Co., of Quincy, Mass., just a month after the seven-master Thomas W. Lawson was launched from the same yard.

The Hardie Co., of Canton, N. Y., has been incorporated under the laws of the State of New York. It will continue the manufacture of printers' folding machines and mailing machines hitherto sold by J. G. Hardie, the secretary and manager of the company. The company is also preparing to put on the market a paper cutter in some respects quite different from any paper cutter now in use. The company's work is being done for them at present by other parties. W. C. Hardie is president of the company and G. R. Hardie, treasurer.

The Schwab Safe Mfg. Co., of Fostoria, O., has changed its name to the Atlas Safe Co. E. W. Ervin is the president.

The Willoughby Fork & Mfg. Co., Willoughby, O., has increased its capital from $100,000 to $200,000.

The Colonial Electric Co., of Ravenna, O., has secured a contract calling for some 200 ceiling and desk fans for shipment to China.

A Louisville newspaper says that Charles D. Gates, president and general manager of the Turner, Day & Woolworth Handle Co., has just returned from New York where he conferred with capitalists who are promoting a $25,000,000 trust to take in all the ax manufactories, handle manufactories and grindstone factories in this country and Canada, the plants to be operated under one management.

John White, proprietor of the London Bolt & Hinge Works, London, Ontario, has been in the rolling mill business at Guelph for several years and has also had a bolt factory in London. He is now moving the Guelph mill to London and is improving and enlarging the plant, making it modern in every respect. The move is made to have the mill in closer touch with the bolt business. The name of the company was recently changed to the London Rolling Mills Co., Ltd.

The Thomas Bailey Foundry & Machine Works and Athens Foundry & Machine Works, of Athens, Ga., have consolidated, and will represent holdings of the value of $100,000, under the management of Thomas Bailey.

The Fitzgibbons Boiler Co. is arranging to move its plant from Oswego, N. Y., to Waterloo, Iowa. The company will be reorganized with a capital of $100,000, of which $70,000 will be paid up.

The E. Keeler Co., of Williamsport, Pa., which recently secured a contract for eleven miles of iron water pipe for the city of Portsmouth, N. H., is considering the advisability of locating a branch factory at the latter city.

The foundation for the Grand Crossing Tack Co.'s new building at Calumet, Ill., has been laid and work on the first story is begun.

C. H. Halcomb, of New York, formerly president of the Crucible Steel Co. of America, W. S. Townsend and C. J. Ragan, of Utica, N. Y., and B. Smith, of Detroit, were in Buffalo a few days ago and viewed a site of 60 acres near that city, where, it is reported, a crucible steel plant will be erected.

The Buckeye Brass & Iron Works, of Dayton, O., have secured a contract for a 60-ton cottonseed oil mill for shipment to South Russia via Batoum.

Regarding a demand for catalogues in Amsterdam, United States Consul Frank D. Hill, of Amsterdam, under date of July 24, 1902, writes to the State Department that it would be advisable for exporters of iron, steel, coal and electrical supplies to send catalogues to that consulate, as he intends to devote a room exclusively to circulars of American firms, folders of American railways, steamship lines, cable companies, etc. He has received many visits of late from people interested in the import trade, and they desire data in regard to United States industries. Reports of chambers of commerce would also be useful.

The Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., has awarded contracts for the erection of 200 additional coke ovens.

The new small tool department and additions to the machine shop and foundry of the Pratt & Whitney Co., Hartford, Conn., will be completed about Oct. 1. Employment will be given to about 1,400 additional hands. The small tool department will be 152 feet long and 80 feet wide. It will be four stories high.

The work of erecting the new plant of the Rochester Machine Screw Works, Buffalo, N. Y., is progressing rapidly and the installation of the machinery will be commenced shortly. Efforts will be made to place the entire plant in operation on October 1. The building is four stories high, 120 feet long and 50 feet wide.

The Pittsburgh Gage & Supply Co., Pittsburg, is furnishing two 125-h. p. boilers to the Cadiz Electric Light & Power Co., Cadiz, O., besides giving the power plant a general overhauling. For the Sleepy Eye Milling Co., Sleepy Eye, Minn., a complete oil filtering system has been furnished. The company has in press a new general catalogue of some 686 pages, which will be a complete exposition of illustration, descriptions and price lists of general machinery and supplies. The book will be ready for delivery about Sept. 1.

At a meeting of the stockholders of the United States Wire & Nail Co., of Pittsburg, held on Saturday, Aug. 23, it was decided to increase the capital stock from $200,000 to $300,000. The increased capitalization is to provide for the extensive additions and improvements that the company now has under way. A continuous heating furnace is being erected at the plant, Shousetown, Pa., and a galvanizing plant, woven wire fence and bale tie department are being added. The galvanizing plant will be placed in operation shortly and the entire plant will resume within a few weeks. The products of the company consist of wire nails, wire rods, wire bale ties, plain annealed and galvanized fence wire, annealed bright and galvanized market wire and galvanized telephone wire. The offices of the company are in the Lewis building.

The plant of the Niles Mine and Mill Supply Co., Niles, O., was destroyed by fire Tuesday of this week. Loss about $25,000, insurance $8,000. The company is undecided about rebuilding.

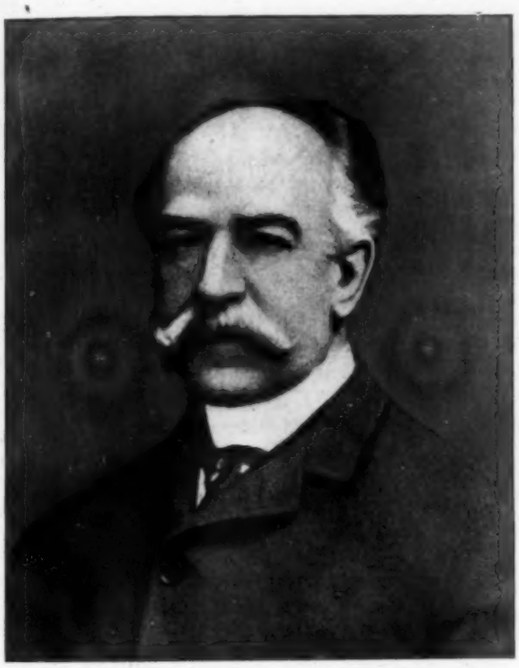
The plant of the Pittsburg Tool Steel Wire Co., recently erected at Monaca, Pa., is now in operation and the company is prepared to take care of all orders for drill rods, needle wire and all other wires requiring a high grade of steel.

In an endeavor to get a quantity of structural steel in a short time the contractors who have in hand the building of the University of California, at Berkeley, recently placed a large order in Belgium, only to have the whole amount rejected by the architect. The order was well under way when the architect of the new building heard of the mattter. An inspector was sent to Germany to look after the steel. Belgian manufacturers apparently did not relish the attention, for none of the facilities ordinarily afforded was provided and no complete tests of the steel could be made. The Belgians, however, frankly admit that their steel is of soft variety, only calculated to stand a test of 50,000 pounds to the square inch; whereas, the plans for the new building required a strength of 60,000. Under these circumstances the architect refused to have the Belgian steel placed in the building and the order had to be cancelled.

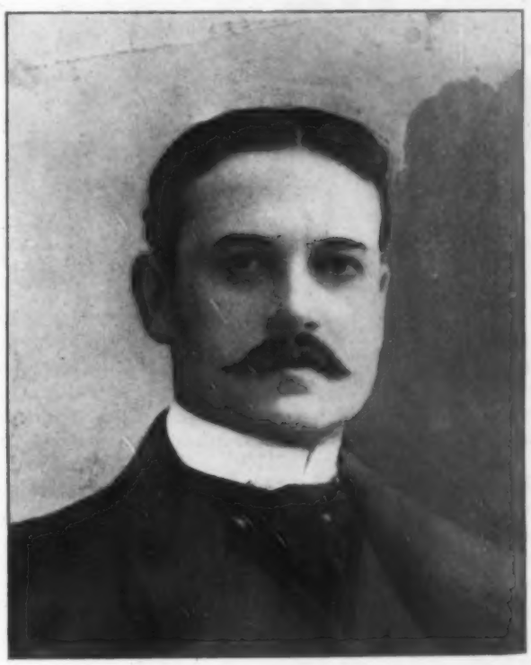
NEW PRESIDENT OF THE NATIONAL TUBE CO.

Col. Frank J. Hearne, of Pittsburg, who resigned last week as president of the National Tube Co., has been identified with the iron and steel industry of this country for thirty years. He received his technical education at the Troy Polytechnic Institute and immediately after his graduation became assistant engineer of the Hannibal & St. Joseph Railroad. In 1872, at the solicitation of his father, he became assistant manager of the Riverside Iron Works at Wheeling, W. Va., and the subsequent growth of the plant was largely due to his great energy and activity. Upon the formation of the National Tube Co. he was elected vice president of the combine and succeeded to the presidency upon the retirement of E. C. Converse, who became a member of the executive committee of the United States Steel Corporation. He is 56 years old, the age at which his father, William J. Hearne, retired from active business. He will devote his entire attention to his extensive private interests.

W. B. Schiller, who succeeds Mr. Hearne as president of the National Tube Co., is 43 years old. He was born in Pittsburg, his father, John G. Schiller, being an iron manufacturer.



COL. FRANK J. HEARNE,
The Retiring President of the National Tube Co.



WM. BACON SCHILLER,
President of the National Tube Co.

W. B. Schiller was educated at Youngstown, became an office boy for R. W. Hitchcock & Co., bookkeeper in 1879 in the Second National Bank, Youngstown, secretary in 1883 of the Brier Hill Iron & Coal Co., from 1886 to 1889 treasurer and general manager of the Youngstown Coal & Coke Co., Ltd., and Bessemer Limestone Co., and general manager of the Monongahela Furnace Co. of the National Tube Works Co. from 1889 to 1892. He was manager of the tube company's blast furnaces and steel works to 1899, when the National Tube Co. was formed. He became manager of the National department of the combine, and in April, 1901, was elected a director and assistant first vice president. He became first vice president on the formation of the United States Steel Corporation.

The structural steel for the main building of the Norwalk Steel & Iron Co.'s plant, at Norwalk, O., has now begun to arrive after a long delay of two and a half months.

The Waterbury Farrel Foundry & Machine Co., Waterbury, Ct., have opened an office in Cleveland at 263 St. Clair St.

Citizens of Rome, Ga., are organizing a company to establish a plant for the manufacture of freight cars. The capital will be $50,000.

VIRGINIA IRON, COAL & COKE CO. REORGANIZED.

The Virginia Iron, Coal & Coke Co., of Richmond, Va., now in the hands of receivers, has been reorganized by the Morton Trust Co., of New York. By the adjustment the company is relieved of its present embarrassment and the property is to be turned over to the company's management by the discharge of the receivers, and pending suits for foreclosure are to be discontinued.

Payment of the back interest on the company's bonds, settlement of receivership debts, and the removal of some of the underlying mortgages are contemplated in the reorganization plan. Two million dollars' of Virginia and Southwestern railroad bonds will be issued, and $1,000,000 of new railroad stock, the latter not including the $1,000,000 of the railroad's stock now held by the Virginia Iron Co.

The Virginia and Southwestern railroad is owned by the Virginia Iron, Coal and Coke Co., and is known as "The Natural Tunnel Route."

The obligations of the Virginia Co., upon a $1,000,000 loan negotiated by the receivers, a $575,000 mortgage and interest held by the Morton Trust Co., and other accounts, will be discharged by the proceeds from the new bonds and stocks. By the settlement of these obligations, there will be no mortgage liens on the property of the Virginia Co., except the lien of the mortgage of the Manhattan Trust Co., securing $7,000,000 of outstanding bonds; the lien of the mortgage of the Virginia and Tennessee Coal and Iron Co and the lien of the Carter Coal and Iron Co. to the Continental Trust Co., securing $585,000 of bonds.

By the terms of the adjustment bond holders will deposit their bonds with the Morton Trust Co. by September 3rd.

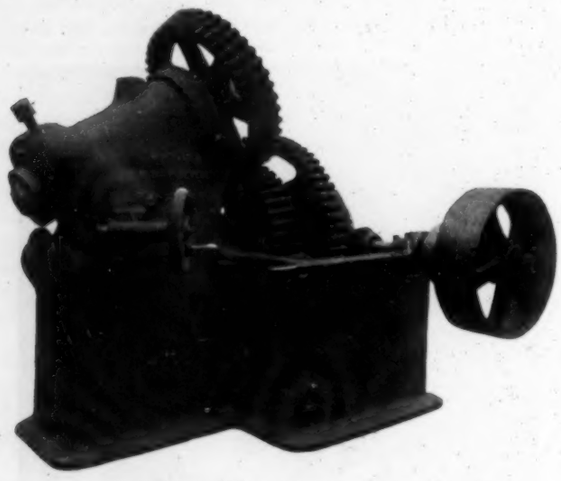
The Donovan Iron Works, Toledo, has secured a large contract for steel structural work, elevator inclosures and other materials from A. F. Curtis, president of the Lion Dry Goods Co., for a building and business in Montgomery, Ala., which Mr. Curtis is reconstructing and reorganizing.

The Southern Iron Works is the name of the company formed by the consolidation of the Dublin Iron Works and the Southern Iron Works of Mt. Vernon, Ga. A general machinery and supply business will be carried on.

A cinder conveying machine has been installed and placed in operation at the Mary furnace of the Ohio Iron & Steel Co., Lowellville, O.

A ROTARY BEVEL SHEAR.

The illustration herewith is of the Wangler rotary bevel shear which has been put on the market by the Scully Steel & Iron Co., of Chicago. It is designed to meet the requirements for beveling in boiler and iron working shops, ship yards, bridge works, etc. A chief feature is the simplicity of design and mechanical construction, in which strength and durability are apparent. The upper cutter is a plain disk having a periphery parallel to its axis of rotation, and the lower cutter is mounted on a horizontal shaft rotating in a vertical plane, which intersects the plane of the upper cutter. Its periphery is beveled at both corners with an intermediate flat portion serving as a support for the work, and the cutting edge of the lower cutter is at one side of the flat portion and upon the inner bevel, and therefore entirely within the plane of the cutter, so the strain is vertical and at right angles to the axis or shaft of the lower cutter. Both upper and lower cutters can be reversed and used on either edge. The upper cutter shaft is adjusted by the screw, as shown, and held in place by weights.



THE WANGLER ROTARY BEVEL SHEAR.

The machine is fitted with friction pulley, and is powerfully geared. It will bevel ¾-inch plate. When so desired the machine may be geared direct to an electric motor.

During July a total of 200 tons of manufactured machinery, chiefly engines, was shipped from the West Allis shops of the Allis-Chalmers Co. These were the first shipments from the new plant. It has been decided to extend the main foundry building from 212 to 220 feet in width to a total length of 760 feet.

Parke, Davis & Co., Detroit, Mich., manufacturers of drugs and chemicals, are making extensive improvements and additions to their electrical, steam and power plant, the work being done under the direction of George W. Scott, consulting engineer, the Rookery, Chicago.

There are now six of the open-hearth furnaces of the Dominion Iron & Steel Co., Ltd., at Sydney, Nova Scotia, in operation. The entire production of billets and slabs has been sold for some time to come. Two steamers are employed carrying steel to the United States. Regular shipments of pig iron are also made.

The name of the furnace at Charlotte, N. Y., has been changed from "Charlotte" to "Genesee." It has been leased by Corrigan, McKinney & Co., of Cleveland. William Bingham is the superintendent. The furnace will probably be blown in on coke early in September. It has an annual capacity of about 18,000 gross tons.

The Howard Elastic Wheel Co., which recently removed to Wabash, Indiana, from Kalamazoo, Mich., began operations in its new works, at the foot of Canal St., a few days ago.

A NEW PROCESS FOR THE FUSION OF METALS.

A process for the fusion of metals is the subject of a patent issued July 1 to Hermann A. E. Menne, Ph. D., Creuzthal, Westphalia, Germany. It is often of the greatest importance in various metallurgical industries to effect the rapid fusion of hardened or metallic masses, as residues or slag in blast furnaces, Martin furnaces, cupolas, etc., and the object of the invention is to remove such masses by means of a suitable method in applying an oxyhydrogen gas burner.

The inventor says: "Although the temperature of the oxyhydrogen gas flame is considerably higher than the melting point of most metals which are difficult to melt it is not easy by means of this flame to effect in a short time the melting of large masses of material having a high melting point—for example, to melt down in a horizontal direction a block of iron of about 100 millimeters thickness and a weight of 50 kilograms. In the first place the heat absorption weakens the heat supply too much, and secondly, when the melting process begins and the hole, or 'pit' formed commences to become deep or large the molten metal as soon as it is beyond the reach of the hot flame, on the one hand, tends to close up the entrance of the hole by rehardening, and, on the other hand, flows to and fro before the flame, and thus screens fresh points of attack for melting by the flame. According to this invention, however, a satisfactory melting is effected in a few minutes.

"A combustible gas, such as hydrogen, is conducted through the outer tube of a Daniell burner or oxyhydrogen 'jet' of about 20 millimeters clear width and ignited at its outer end. Oxygen is then blown through the inner narrow tube, about 4 millimeters bore in the first place, at moderate pressure—say about one atmosphere or less. As the block of iron or metal becomes heated up to a temperature at which the iron begins to burn in oxygen the supply of oxygen is increased, so that it eventually escapes at a pressure of about six atmospheres even up to twenty atmospheres or more.. The flame becomes cooler, but the iron and its combustible ingredients—such as P, Si, C, etc.—develop when burning such an enormous heat that the iron particles in the neighborhood of the flame become molten. When now these molten particles are pressed aside by the high-pressed gas quicker that the derivation of heat is able to chill the iron again, the danger of derivation of heat is avoided and the melting succeeds, no matter how deep the object to be melted through may be. The high pressure of the oxygen, moreover, has the advantage of enabling me to make holes in vertical direction. The molten and oxidized masses spring like a fountain up to 10 meters or more out from the formed pit. It is therefore clear that I can make holes in horizontal direction of almost any length and a relatively small cross section—say 70 to 100 millimeters. This is of great value, say, for instance, in furnaces and the like when the delivery hole is obstructed, my process allowing a quick emptying of the furnace. It is possible to produce holes of more than 1 meter in 3 to 5 minutes. The increasing supply of the oxygen can be easily regulated without much practice, and it is unnecessary to indicate special instructions or means. The gases can be obtained from gasometers or directly from gas-making apparatus—for example, petroleum-gasifying apparatus, gasoline apparatus, oxygen-making retorts, etc. It is most convenient for practical purposes to obtain them from steel cylinders of a capacity of about 40 liters, in which they are compressed at a pressure of about 100 atmospheres, so that each cylinder can contain about 4 cubic meters of gas. Reduction valves or regulators provided each with a pressure-gauge are arranged on the cylinders, which valves may be set at different pressures by turning a regulating screw inward and outward. Suitable tubes connect the reduction valves with the two tubular ends of the Daniell burner or jet, which may be of any desired length—for instance, several meters.

"When the combustible slags or masses are sufficiently hot to burn in the oxygen current, the hydrogen gas can be entirely cut off and the melting can be continued with oxygen gas only. This is a way for obtaining narrower holes, as the oxygen gas escaping from its narrow nozzle attacks a smaller area than the larger combined flame. This is of great value, for instance, for melting down a slag mould

stopped up with cast iron—say a cooling mould of copper about 30 to 50 millimeters opening—in which case it is of particular use, for the copper does not burn at its melting point in the oxygen gas, so that the copper mould is not injured, while the iron can be blown off right down to the copper walls of the mould.

"The melting with oxygen gas only is not a fundamental alteration of the melting effected by a combined hydrogen and oxygen flame having a great excess of oxygen gas, since the combined flame itself is so strongly cooled by the oxygen gas blown through the hydrogen that it cannot support the melting operation. The melting, therefore, is effected only by the burning heat of the material. However, under certain circumstances the combined flame is of some value—viz., the less combustible the residues are the higher is the temperature necessary for their combustion and the more care must be taken in supplying the oxygen gas without interruption to the burning point in order to prevent the latter from cooling down below the temperature of combustion. In practice this is difficult, because of the unavoidable vibrations of the advancing or moving burner tube or jet. It is therefore preferable to maintain the combined flame which heats and keeps warm the adjacent space around the burning point, and thereby prevents the cooling from taking place. In the case of pure or almost pure iron the continuation of the melting operation is easily effected by the use of oxygen gas alone.

"It may be remarked that by the expression 'fusion of hardened or metallic masses' the melting down of tapping holes in casting pans, particularly in Martin furnaces, is included and that the present method is particularly of great convenience for such purposes."

Dr. Menne describes a form of burner and broadly claims: "The process of effecting the fusion of hardened masses particularly the residues or slag in furnaces which consists in applying a jet of gas under pressure to said masses, said jet being composed of any combustible gas and a surplus of oxygen to melt said masses and burn the components thereof, said jet being of such a high pressure as to remove the molten masses out of the pit formed by said masses when melted."

Alabama Coal and Iron Report.

At the regular meeting of the directors of the Alabama Consolidated Coal & Iron Co., the quarterly dividend of 1¾ percent on the preferred stock was declared payable on September 1. The report of the treasurer for the three months ended July 31 showed net earnings, after charging off prospective repairs, royalty, depreciation and interest, of $110,732.87. The quarterly dividend requires $43,106, leaving a surplus for the three months of $67,626.87, or at the rate of 10½ percent on the common stock.

President Bush reported that work on the new furnace at Gadsden, which is expected to make from 250 to 300 tons of iron a day, is being vigorously pushed with a view to completing it, if possible, by January 1. Contracts have been let for 50 additional coke ovens, and 50 now under construction will be completed about September 1. All of these enlargements, including the furnace, are being made out of the surplus earnings, the policy of the management being to develop the coal and iron output to probably double the present production as rapidly as possible. The new coal mine Hewitt made its first output of coal last week, the average weekly production now being nearly 11,000 tons. The iron which is now being delivered was sold some months ago at an average of about $13 a ton.

The Pennsylvania Railroad Co. has completed plans for increasing the capacity of the Juniata shops, about 1 mile east of Altoona, Pa., almost 50 percent. The present capacity is 120 locomotives annually. When the present extensions are complete the annual output will be fully 200. This will make it possible for the Pennsylvania to supply her motive power independent of the Baldwin works in Philadelphia, and it will give employment to from 1,000 to 1,500 more men. Another important feature will be the installation of a new frog and switch plant in the ship department. Heretofore all such equipment has been furnished by the Union Switch & Signal Co., of Pittsburg, but it is now the intention to eliminate all contract work, so far as possible, from the annual appropriation. Construction work has begun.

UTILIZATION OF BLAST FURNACE WASTE GASES.

The problem of the utilization of the waste gases from blast furnaces and coke ovens has for more than ten years been a most interesting one to many engineers in Belgium and Germany. Dr. Otto's experiments on the utilization of the by-products (gas, ammonia and tar) of coke ovens go back almost a score of years. Experiments on the utilization of waste gases from blast furnaces have been successfully carried on now for almost ten years in Europe, where the saving in fuel which might be effected, and the gain in power which might be obtained, has been more quickly recognized than among the most conservative engineers of England and among the engineers of this country, accustomed as they are to the very best of fuel, ores and fluxing materials, and at the very lowest prices known to the engineering world. From a paper recently read before the British Society of Engineers by Mr. Brierly Healey (*The Iron Trade Review*, Aug. 14-21), it would seem as though attention was being given to the subject in England. He states that, after allowing 35 percent of the gases of a modern coke blast furnace, having a capacity of 1,500 tons per week, to be used in the stoves for heating the blast, of the remaining 65 percent, the gas-engine-driven blowing engine will require 900 horsepower, 100 horsepower will be needed for hoisting, pumping and other purposes, leaving 5,000 horsepower available for utilization, or for distribution and sale as mechanical, electrical or thermal energy for any purpose desired.

Comparing this estimate with the estimate based upon the test of an actual blast furnace plant, as published on page 148 of our May issue, it would seem that these figures are conservative rather than otherwise. The furnace there described produced about 1,000 tons per week, generated 646,910 cubic feet of gas at 60 degrees F., having a calorific value of 118 B. T. U. per cubic foot, which it was estimated was capable of developing 7,634 horsepower. The steam-driven blowing engine indicated 680 horsepower, while the boilers generated 1,150 nominal horsepower. Allowing 484 horsepower for emergencies, a balance of 6,000 horsepower was still left "for sale for lighting, power and other purposes." As Mr. Healey's estimate is based upon a furnace of 1,500 tons weekly capacity, instead of 1,000, his estimate of 5,000 horsepower remaining for sale instead of 9,000, as the above figures would suggest, is extremely conservative and safe.

Accepting Mr. Healey's figure of 5,000 horsepower available for sale from a furnace having a capacity of 1,500 tons per week, it would mean 3 1-3 horsepower continuously available per ton of pig iron cast per week, or 23 1-3 horsepower continuously available per ton of pig iron cast per day. From these figures, which as has been shown, are extremely conservative, the amount of horsepower now wasted at a blast furnace can be easily calculated from either its daily or its weekly capacity.—[Gas Engine.

The day laborers employed by the Ohio Falls Iron Co., New Albany, Ind., received a 10 percent advance in wages recently. The advance was made without solicitation on the part of the men.

At the annual meeting of the stockholders of the Union Malleable Iron Co., Moline, Ill., officers for the ensuing year were elected as follows: F. W. Gould, president; O. M. Stowe, secretary and treasurer.

The differences between the National Chain Makers' Union and the Standard Chain Co., at Marion, Ind., have been adjusted after a strike of five weeks. Both sides made concessions.

The old Cornwall Furnace of the Cornwall Iron Co., of Cornwall, Pa., is still standing, although it is not likely to ever again blow in. It was built in 1742.

The White-Evans Mfg. Co., Bloomington, Ill., which has taken over the plant and business of J. F. White, manufacturer of agricultural machinery, will add to the present line the manufacture of the Little Giant wagon dump and elevator.

AMERICAN AND BRITISH BESSEMER PRACTICE.

Enoch James, the member of the American Commission of the British Iron Trade Association who came to the United States last year to investigate steel works practice, contributes a very interesting portion of the commission's report, which was recently reviewed in these columns. We quote as follows:

"To summarize, it may be stated that compared with English practice the American Bessemer shops are called upon to do less work in converting a ton of pig iron into steel; their methods of doing it are unquestionably better, and the means provided for doing it are superior to those seen in Great Britain. In other words, the great difference between Bessemer practice as carried on in the two countries is found in the quality of the pig iron converted in the use of a metal mixer, and casting ingots on cars, stripping outside the converter house, better blowing power, and other mechanical appliances for regular working. The most important feature is the quality of the pig iron supplied to the converters. The length of a blow depends mainly upon the amount of silicon in the pig iron. At the Edgar-Thomson furnace F. the analysis shows that in 1890 the silicon was 1.60 per cent. As this furnace has given the largest makes it is natural to assume that the silicon was somewhat lower than was obtained from the other furnaces in operation at that time. In 1896 Mr. Franklin Hilton, in his notes upon the same works, gives the silicon as 1.25 per cent. Now, however, 1.00 per cent. is not often found, and 80 per cent is quite sufficient for the Bessemer shops. This reduction in the content of silicon is due to the fast driving of the blast furnaces, and also to the low percentage of silica found in the iron ores. As this comes within the scope of the report of my colleague upon blast furnace practice it will not be dealt with here, further than to say that faster driving at the furnaces has resulted in a pig iron that is more favorable to th econverting department and requires much less blowing to purify it.

"Many blows were seen started and finished in eight minutes, and as two blows were often proceeding at the same time, the number of blows was increased. At South Chicago, on Wednesday, August 7th, 1901, with the weather exceedingly warm and the people dying in the cities owing to the heat, 15 blows were obtained in one hour. This was done with great ease, for no men could stand much exertion that day, and yet the work proceeded without any fuss or difficulty. The iron was at the exact pitch, there was a plentiful supply at hand, there was little or nothing to do to the tuyeres, three converters were fully occupied, and there was no waiting for casting ladles or the clearance of ingots, but each section did its share of the work with smoothness and regularity, like automatic machinery. This was the quickest working witnessed at any of the works, and it clearly shows what the possibilities are when the iron is the lowest in silicon that will pass with the quickest working.

"Again, at the Edgar-Thomson Works on Tuesday night, July 16, 1901, 110 blows were made, after a shift of 97 blows on Tuesday, followed by 96 blows on Wednesday. For large outputs these works and South Chicago have for a number of years run a very close race. The amount of slag produce at each blow is much less than with us, this depending, of course, upon the percentage of silicon in the iron.

A Business Man's Book on Success.

"Top or Bottom—Which? An Inquiry into the Causes of Success and Failure in Life, from the Standpoint of a Business Man." Under the above title, Mr. Archer Brown, of New York, of the well-known pig iron selling firm of Rogers, Brown & Co., has brought out a little book which is dedicated to his two sons. There are introductory words by Bishop Charles H. Fowler, Hamilton W. Mabie, Andrew Carnegie, President Angell of Michigan University, and Irving Bachelle. Mr. Brown packs into ten brief chapters a vast amount of wholesome thought on the way to success in life. It is not of the didactic order so generally exemplified in books of the sort, but rather an appeal to reason and experience in support of the ground the writer takes on questions that are of vital moment to boys and young men. Mr. Brown's early training in journalism is in evidence in the clear, forceful style of the book, and his treatment of the subject is neither narrow nor the opposite, but eminently judicial and helpful. The reading of such a book will not only help those for whom it was especially prepared, but will be full of stimulus to men well along in the race for success.

American Locomotive Company Report.

The American Locomotive Co. will issue its first annual report September 1 and it is predicted that a very favorable showing will be made.

The home demand for locomotives has been greater than ever before, and the orders show little sign of falling off. As a result of this home demand, which has called for practically the entire output of the American Locomotive Co., no systematic effort has been made to go after foreign orders. Notwithstanding this, however, a number of foreign orders were received during 1901 and during the first six months of this year. These orders came from Africa, Mexico and Japan, the last in competition with British and German builders. American locomotives are coming into greater favor in all foreign markets, and with the capacity of the different plants of the American Locomotive Co. enlarged a systematic effort will be made to go after foreign orders. At present, however, the home market absorbs nearly the entire output. The demands for locomotives by the railroads of this country has exceeded all expectations. This demand has been so large that notwithstanding a constant increase in the locomotive output nearly each year has shown a smaller number of locomotives exported. In 1897, there were 1,251 locomotives constructed in this country, of which 31 percent was exported. In 1898, the number constructed increased to 1,875, while the total exported declined to 30 percent. The number of locomotives built in 1899 increased to 2,473, while the percentage exported decreased 2 percent, as compared with the previous year. Large extensions will be made to a number of the plants of the company.

Cutting Metals by the Use of the Electric Arc.

The London *Colliery Guardian* says that at a colliery in the Dortmund District of Prussia it was required to dismount a horizontal arm of the pump rods; but this was found impossible, owing to the rusting of the bolts and cotters, while the part in question could not be cut through by hammer and chisel on account of the small space at disposal. It was therefore determined to effect the separation by means of the electric arc. The energy employed was obtained from a continuous current dynamo, generating 320 amperes at 110 volts, which served for lighting, the negative pole being put in connection with the pump rod, and the positive with a carbon of 20 millimeters diameter, held in a well-insulated gas pipe. The latter was fitted with a rest, so that the carbon might be guided by hand; and, for preventing danger from fire, a bucket filled with sand was placed under the spot where the melting was to be effected, while a small hand pump was also held in readiness. For protecting the men's eyes from the bright light, red and green glasses were provided, to be held in the hand. The work was carried through with a current of 320 amperes at 60 to 70 volts, the carbon point being held from 40 to 50 millimeters away from the point to be melted in such a manner that a vertical slot of 20 to 30 millimeters was formed, and then gradually deepened. The guiding of the carbon, which became more difficult as the depth increased, had to be effected in the upward direction, so that the molten iron might fall in drops. The work was performed by six men, who relieved one another every hour or half hour, in about 12 hours altogether, including a few interruptions. No inconvenience was experienced by the men during the operation; but afterwards all of them felt more or less severe pains in the face and hands, while those who did not always use the glasses also suffered in their eyes. The pains, however, lasted only a short time.

The new plant of the Jessop Steel Co., Washington, Pa., will be placed in operation about October 1. The citizens of the town are arranging an industrial celebration to be held on that date on account of the location of a large number of plants there during the last year.

USE OF CHAIN FOR PROPELLING STEAMERS.

The Consul-General of the United States at Dresden, Chas. L. Cole, has furnished the Department of State a detailed account of the use of chain boats on the River Elbe. The magnitude of the undertaking forms an interesting subject to the engineer, though the method employed is of a decidedly primitive type in comparison with modern systems of transportation. The actual expense of maintenance would have been a welcome addition to the other particulars but, so far as the description proceeds, it is clear enough even if the worthy Consul-General seems to have been hampered a little by the mechanical terms. The "fingers" which are grouped four or five together forming "hands" and which "are also journaled in hands" do not have a familiar sound when described in this manner and the author may mean a combination of parts requiring the amputation of the "hands" and attaching the "fingers" directly to the "arms." The description is as follows:

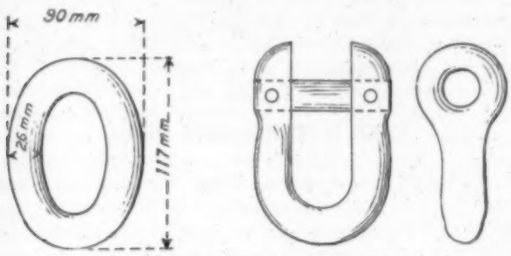


FIG. 1.—LOCK LINKS FOR CHAIN BOATS.

The use of a chain for propelling steamers on the River Elbe was inaugurated in 1866, and has proved an economical and successful means of navigating the swift current of that river. Much of the region traversed by the river is skirted by mountains, and as the stream is narrow, the current is necessarily rapid and strong. The first experiment was made for the purpose of towing barges under the bridges with numerous piers at Magdeburg. Now, a chain lies in the channel of the river from Melnick, a point in Bohemia, to Magdeburg, a distance of some 290 miles. At one time, the chain extended to Hamburg, but as the country is flat and the current of the river sluggish below Magdeburg, its use between that city and Hamburg was abandoned in 1898. The system is controlled by two companies—the Chain Elbe Navigation Co., whose authority extends from Magdeburg to the Bohemian boundary, and the Austrian Northwest Steam Navigation Co., in Bohemia.

These companies own and operate 34 steamers, a few of which are provided with propellers, but most have no means of locomotion except the chain, which they use going up or down stream. The dimensions are: Length over deck, 38.3 to 55.67 meters (105.9 to 182.5 feet); width amidship, 6.7 to 8.2 meters (21.9 to 26.8 feet); draft without fuel, 0.6 to 0.88 meter (1.9 to 2.8 feet); number of boilers, 1 to 2; heating surface, 82 to 90 square meters (882.6 to 968.7 square feet); efficiency of engines, 100 to 200 indicated horsepower. The boats are of symmetrical structure, and by reversing the engines move up or down stream without turning. The are provided with rudders at either end, operated independently by a pilot wheel located in the center of the boat.

The course of the steamer is not seriously influenced by the chain, and it usually obeys the helm as if it were free. The hull and sides are made of iron, and to meet the rise and fall of the chain, the deck slopes on an incline of about a yard from the center toward each end. The vessels are provided at each end with outriggers, which swing in a semicircle around a pivot by means of rollers on rails, and serve to take up the chain out of the water at the bow of the boat and drop it at the stern. The chain runs over the forward outrigger and over several roller disks until it reaches a steam drum (or drums) located in the center of the boat, which it encircles three times. It is then carried aft over another set of rollers until it drops into the water.

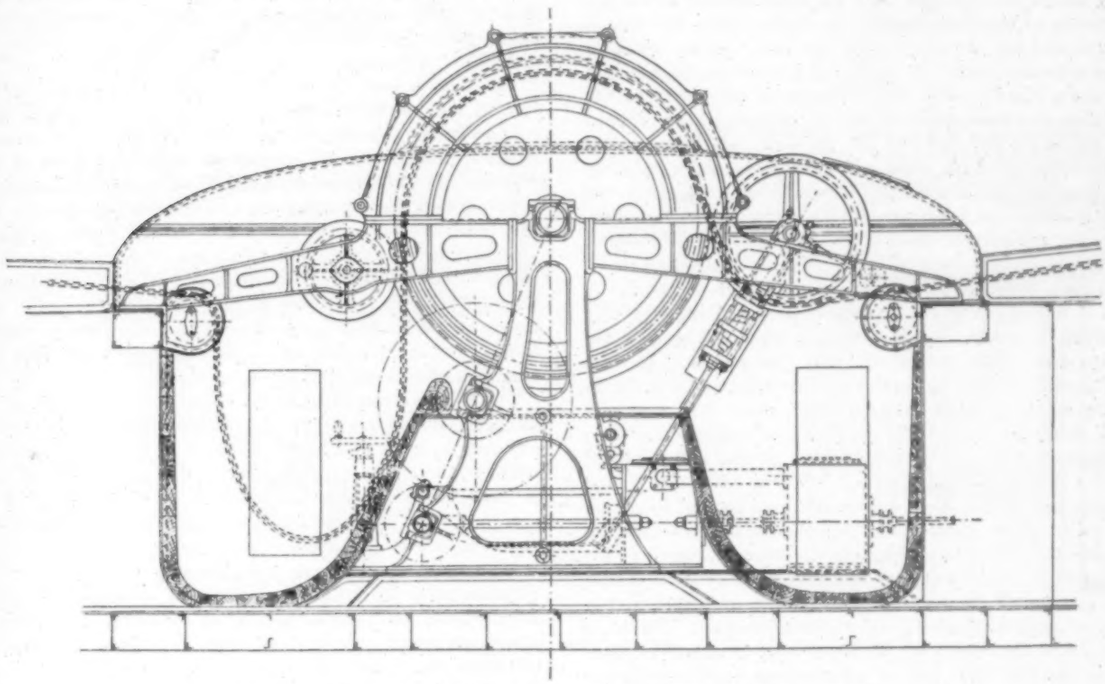


FIG. 2.—CHAIN BOATS ON THE RIVER ELBE. METHOD OF SECURING CHAIN.

By means of gearing the velocity of rotation is altered according to the course of the vessel up or down stream. Each of the chain drums consists of four pulleys arranged side by side and stiffened by steel bands between which forged iron ribs are arranged. Within these grooves, measuring 100 to 108 millimeters (3.9 to 4.2 inches) in width and about 80 millimeters (3.1 inches) in depth, runs the chain, obtaining sufficient friction for operation. The driving machinery in the older types of boats consisted generally of twin machines with injector condensation; but the newer vessels are fitted with four-cylinder compound engines with injector or surface condensation.

The original construction of drum has been replaced in a large number of steamers by the chain-gripping wheel (patent Ewald Bellingrath). This wheel consists of only one driving drum. The chain which, as above stated, wound three times around the drum in order to insure sufficient friction, in this case runs over only about one-half of a drum. It is guided over the ship in the same manner as explained.

On either side of the flanges are provided fingers, four or five of which form a hand. These fingers are provided with springs, which cause the fingers to press against the individual

links of the chain. The fingers are also journaled in hands which are guided by means of rollers in such a manner that, in ascending, the fingers engage the chain links and prevent slipping of the chain. At the point where the chain leaves the drum, the hands and fingers are pushed aside by a guide frame, thereby freeing the chain. Many of the newer type of vessels are provided with two turbine propellers of the Zeuner system, or ordinary propellers, which enable the vessel to run down stream independent of the chain.

The present length of the chain lying in the River Elbe is 110 kilometers (68 miles) from Melnick to Schmilka (Bohemian border), and 351 kilometers (218 miles) from Schmilka to Rogatz (near Magdeburg). As to the dimensions of the chain, the diameter of the link shanks is 27 to 29 millimeters (1.06 to 1.14 inches); the length of link, 117 millimeters (4.6 inches); and the width, 90 millimeters (3.5 inches). The chain is delivered in pieces measuring from 500 to 1,000 meters (545 to 1,090 yards), and these are connected by means of so-called "lock links," as shown in Fig. 1. Each boat carries a number of these locks on board, which are also used to repair the chain in case of breakage.

As there is only one chain for the up and down travel, the vessels have to leave the chain when passing each other. In such a case, the steamer going down stream stops, locates a lock link, and opens it at the downstream end. To either end of the thus parted chain, ropes are fastened and the vessel slowly moves down stream until the rope fastened to the upstream end of the chain reaches the drum. Then the rope is removed and an auxiliary chain put in its place, which is wound upon the drum—the vessel still proceeding down stream—until the chain reaches the outrigger at the bow. At the same time, the downstream end of the chain has been dropped by means of the attached rope into the water, and consequently will be found near the stern outrigger, where it is taken up and connected again with the forward-chain end, after the auxiliary chain has been removed by replacing the lock link. Before the reconnected chain is dropped again into the water, the steamer anchors itself by means of a small auxiliary chain to the main chain, to prevent its drifting down the river. A signal is now given to the upstream vessel, informing it that everything is ready, and it advances until both vessels are side by side. Both vessels are now tied together, and the down vessel is taken up stream a short distance in order to free the auxiliary chain from the main chain. The upstream vessel slowly proceeds until the lock link reaches the stern out rigger, where it is opened, the downstream end is picked up and a thin rope attached to it. It is now taken over to the rear outrigger of the down vessel and there secured by means of a catch. This steamer now is allowed to drift until its forward outrigger comes alongside the stern outrigger of the upgoing vessel. The auxiliary chain of the down boat is now taken in through the rear outrigger of the up vessel, and is connected again to the front end of the main chain. The down vessel drifts the length of the loose chain that has accumulated in the rear chain box of the upstream boat, and the latter can now proceed, the downstream vessel following until at first the auxiliary chain and then the main chain have run over the drum. The auxiliary chain is now disconnected and the end of the main chain is drawn by means of the rope through the rear-chain groove up to the rear outrigger, and there connected by the lock link to the other main chain end. The two steamers have now passed each other, and, both being on the main chain, can continue on their way. The whole operation takes between 15 and 30 minutes.

In case of breakage of chain, quick stopping is called for, which is accomplished by setting the machinery at rest and by securing an anchorage. If the chain breaks on board, the repair is quickly effected by putting in a lock link, of which a supply is kept on the vessel. If, however, the break occurs in the water, the lost end has to be grappled for. If the vessel is provided with propellers or turbines, a grappling anchor is used, which is dragged over the bottom of the river, the vessel operating sideways. If, on the other hand, the vessel is not self-propelling, a small rowboat which accompanies each steamer is manned, and from it grappling anchors are dragged. When the end is raised, it is drawn on to the steamer and connected with the other chain end. Under favorable circumstances, a rupture can be remedied in about 15 to 20 minutes.

The speed up stream on the chain averages 4 to 5 kilometers (2.5 to 3.1 miles) per hour and down stream 10 to 12 kilometers (6.2 to 7.5 miles) per hour. The consumption of coal (brown soft coal from Bohemia) on the older type vessel averages 3.5 kilograms (7.7 pounds) per indicated horsepower per hour, but a compound machine reduces this amount to 2 to 2.5 kilograms (4.4 to 5.5 pounds).

By the use of the chain, a steamer can tow four to six barges containing 1,200 to 1,500 tons, at a speed not attainable by powerful side-wheel towboats, with about one-third the power and a corresponding saving in fuel.

LAKE SUPERIOR IRON MINES.

A number of new mines are being opened in the Hibbing district this year. They have come to be known as the "Sellwood properties," because Captain Joseph Sellwood, of Duluth, is interested in the operating companies and has general supervision of the several mines now being developed. The new mining corporations are the Latonia, Bradford and Croxton, and Mr. Sellwood is president of each company. He is also general manager of the Agnew and Hawkins mines which are being developed by the Deering Harvester Co., of Chicago. Among the seven properties operated under direction of Capt. Sellwood are represented some of the largest ore bodies known on the Mesaba range. The output of ore will be necessarily small this season, but another year will see the properties under full development and each in condition to make heavy shipment.

The Verona Iron Co. has secured an option on the southeast of the southwest of 17-40-18, in Florence County, Menominee range, upon which it is the intention to do considerable exploratory work. The land is directly north of the Florence mine and is owned by T. W. Harvey, of Chicago.

The mining deal that has been under consideration for the past three weeks between Thomas J. McCusker and the Newport Mining Co. for the ten forties on section 6, Menominee range, owned by Thomas McCusker and G. F. Brown, Crystal Falls and some Milwaukee parties, has been closed. The option as it now reads gives the company the right to the ten forties with a stipulated minimum output of 20,000 tons per year instead of 20,000 tons on eighty acres.

The Northwestern mine, of the Felch Mountain range, which has been inactive since 1884, will resume shipping operations in a few days, or as soon as the North-Western railroad track is relaid to the mine. This property is now under lease to Geo. A. St. Clair, of Duluth, with Chas. J. A. Forell, Jr., as local superintendent. The old shaft was sunk on additional 50 feet and is good ore for the entire distance.

Numerous improvements have recently been made at the Florence mine on the Menominee range. Notable among the improvments are the dismantling of a number of old shafthouses and other unsightly buildings, the substantial repairing of others, the concentration of the stock docks, and a general cleaning up of the surface. General Manager Vogel says that he hopes to have the mine in shape to turn out 200,000 tons of ore in 1903.

The negotiations just concluded by President J. W. Duntley, of the Chicago Pneumatic Tool Co., give to the Chicago corporation control of the International Pneumatic Tool Co. and the Tait-Howard Pneumatic Tool Co., of England, which are now merged in a new Anglo-American combine, called the Consolidated Pneumatic Tool Corporation, with a capital of $10,000,000. It is reported that in addition to the four works already operated in the United States the company will immediately erect a third British plant in the vicinity of the Glasgow shipbuilding district, while the establishment of continental works in Germany is an early probability.

The first heat was taken a few days ago at the new foundry of the American Foundry & Machine Co., Ravenna, O. The entire plant will soon be in operation.

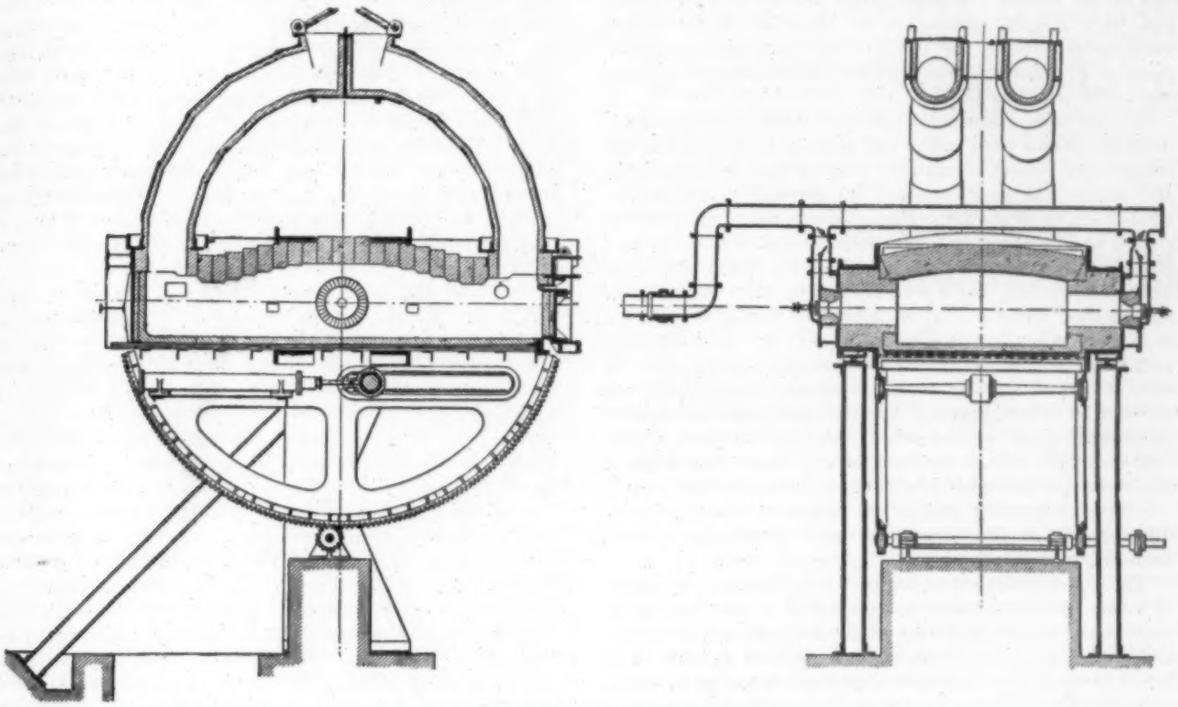
August Melin, of Minneapolis, has purchased the plant and machinery of the Fahrig Metal Co., Ashland, Wis., and will continue the business of the company.

THE ROE MECHANICAL PUDDLER.

"Puddled Iron, and Mechanical Means for its Production," was the title of a paper by James P. Roe at the Philadelphia meeting of the American Institute of Mining Engineers. After setting forth the need of puddled iron, the author proceeded to describe the mechanical puddler as follows:

"The general framing consists of two side plates, suspended from a trunnion on each side, carrying the whole machine, and these trunnions rest upon roller bearings supported by an elevated framework. The side plates are produced on their lower sides, forming segments of circles, to which the operating racks are secured, which gear into pinions driven by a reversing engine. Between the side plates are four distance-pieces, which form girders from one trunnion to the other. The stack bases and the angles under the bottom also serve to form part of and strengthen the framework. The bottom, consisting of a series of water-cooled parts, rests upon the angles referred to, and supports the working bottom of magnesite brick. The same material is used to line the end and sides up to the wash-line of the cinder, the sides above the cinder-line, the roof and the lining of the four stacks being built of firebrick. At present the furnace is fired by means of crude oil and blast, although coal or gas can also be used should convenience or economical reasons require it. Oil was adopted in the present instance on account of convenience of application and ease of regulation. The fuel is introduced through the two trunnions, which form efficient combustion chambers, and the flames directly impinge on each other at the middle line of the furnace, thus producing a most intense and thorough combustion. They then pass to the four converging stacks, two of which are at each end of the furnace, and by this means is assured a complete filling of the chamber. The whole of one end is closed by a door, built up of removable sections, which is suspended from a shaft running across the furnace. The door is opened and closed by two side connecting rods, which connect the bottom girder of the door to a cross-head operated by an hydraulic cylinder under the furnace. Parallel motion in the cross-head is assured by means of pinions at each end engaging in racks fastened to the side plates of the machine. The closed door is locked by means of bolts, operated by hydraulic cylinders which pass through the side plates and connecting rods. These bolts also aid in making tight the joints of the door. The top, bottom, and side edges of the door are made with a ⅛-inch radius, in order to crush and grind out any cinder left on the sill, lintel, or jambs at the time of discharging the ball. The sill and lintel are formed with water-cooled convex surfaces (extra heavy pipe), to chill the cinder in making the joint before charging, and to make it crush and part more easily when the door is closed after discharging. The bottom is rectangular in plan, being about 20 feet by 8 feet 8 inches in the clear, while the sides and ends are straight, and stand at right angles to the bottom. The form of the surface is, therefore, the simplest possible, and the one which is the most easy to maintain. The roof is high in the middle, to give room for flame development, slopes down to direct the flame against the bottom, and rises again to give room for the wash of the bath at the end. The machine can swing through about 65 degrees on each side of the center line of the trunnions. It is therefore a puddling furnace, in which the necessary agitation for producing an intimate mixture of the molten metal and oxides is obtained by allowing them to run down hill, first in one direction and then in the other, and suddenly arresting them at the bottom. The subsequent balling of the iron, when it has come to nature, is produced by precisely the same means."

Sections of this machine are shown in Figs. 1 and 2. Mr. Roe described the process as follows:



THE ROE MECHANICAL PUDDLER.

"It has been sought to embody in the present effort, as far as possible, the general practice in steel works; since there is but one period in the production of iron, that from the beginning of crystalization to the squeezing of the mass, where the change from pig to wrought iron is necessarily different from that to steel. The bottom, sides, and ends of the furnace, being formed as described, are intended to possess relatively permanent characteristics, and thus differ materially from the cinder bottom and sides, fixed with ore, from which much of the cinder necessary for puddling is obtained in the ordinary furnace. It is necessary, therefore, to charge molten cinder into the puddling machine as an equivalent, which is melted in an auxiliary furnace, designed for the purpose. The cinder used for this purpose is the tap cinder from the ordinary furnace, and is not an active puddling agent. It serves principally to seal the door-joints, cover and protect the bottom in a measure, present a medium for retaining the phosphoric acid, form a lubricant as the iron comes to nature and is massed, and, finally, to act as a welding cinder in the ball. Roll scale is added during the process, to act as the principal puddling agent.

"It is intended to use molten iron from a blast furnace by charging it into a mixer, and drawing from that the iron as needed for the puddler, but at this time a cupola is used. This

latter, however, is open to the two objections of greater cost and increased difficulty in obtaining low sulphur.

"The molten iron—in the existing machine varying from 3,000 pounds to 4,000 pounds—is poured through the charging hole immediately after the cinder. As soon as the iron is charged, the machine is oscillated two or three times. Then the oxidizing agent (roll scale or easily-reduced iron ore) is added by means of a long spoon (made of a piece of pipe cut longitudinally in two, which is run in through one of the end peep-holes, given half a revolution and withdrawn, thus evenly distributing the scale through the bath. This is continued between oscillations, until in the judgment of the puddler sufficient scale has been added. This period has arrived when free iron ceases to run on the bottom, or when the bath rises for the high boil. This latter is much more active than in an ordinary puddle furnace, large volumes of carbonic oxide being emitted, which burns above the surface of the bath to carbonic acid, adding materially to the temperature of the furnace and the bath, without any additional fuel. During the periods of scaling and boiling, as the bath descends the inclined hearth, it is most thoroughly agitated and uniformly mixed: in part by the lower strata being retarded by the friction of the bottom, the upper strata flowing over the lower, and, more largely, because, as the direction of the bath is suddenly arrested by the end, it turns over upon itself precisely as an ocean wave does, which is most attractive to those who enjoy watching the sea.

"As the iron comes to nature and thickens, the progress down the hearth from end to end becomes slower, so that the clusters pass slowly through the zone of highest temperature, and acquire the heat necessary for thoroughly welding the whole together in the ball. This massing, or balling, is accomplished by increasing the angle of the hearth, so that the mass slides with sufficient momentum to compress and solidify itself. This mass, or ball, has a length about equal to the width of the machine, a width of about 3 feet and height 24 inches to 30 inches. When balling is completed the side rod wedges are withdrawn, and, as the front end of the machine descends, the door is opened, and the mass is discharged directly into the squeezer by its own gravity. Any free cinder that may exist is discharged ahead of the mass, and falls in front of the squeezer. The door is then closed and locked, the cinder is poured in, and the machine is ready for the next heat."

In order to properly perfect this process, a special squeezer was required, in which the power used is hydraulic, and the method is as follows:

"The power is applied in one horizontal direction, by means of a front girder operated by the cylinder in the rear, and at right angles to this by means of the two end cylinders, thus giving at this time a length of 54 inches and a width of 24 inches to the bloom. The vertical pressure is applied by means of the top cylinder. In order to increase the final pressure, an intensifier is mounted on the squeezer, which raises the hydraulic pressure from the initial 600 pounds to 2,500 pounds per square inch, thus giving a pressure of 1,800 tons on the top area of the bloom. All of the facing plates coming into contact with the mass are sectional, having spaces between them for the egress of the cinder as it is squeezed out of the mass.

"The return motions of the various parts are effected by smaller hydraulic cylinders, and by similar means the bloom is pushed from under the head piece to the open front. The whole is mounted upon four wheels, which run on rails extending in front of and parallel to a series of puddling machines. One squeezer, therefore, would take the balls from all the furnaces, and deposit the bloom at a point convenient to the blooming mill.

"The specific object in having a movable squeezer in to avoid any delay at this important period, as it is vital that the iron be put together before the projecting clusters cool. Besides this, rapid oxidation takes place on the ball being exposed to the atmosphere, thus causing a loss, and producing an infusible oxide, which tends to prevent welding and a thorough removal of the cinder.

"The squeezer has proved very effective as regards shaping up and solidifying its product. There has been some trouble in freeing all of the blooms from cinder, but, judging from the number that has been so freed, and from the fact that the trouble is not in an aggravated form in any, it is believed that by giving the cinder somewhat more freedom for egress, the result will be equally satisfactory in this direction as in the others. All the operations on the bloom after it has left the squeezer are identical with those now applied to steel, thereby extending the economy of production to the finishing mills."

The author considered that in general the puddler and squeezer had been satisfactory, although he admitted there had been some shortcomings; he added the following results.

"The pig iron used has varied in composition as follows:

Sulphur	0.03	0.26
Phosphorus	0.50	1.35
Silicon	0.60	1.40

"Many of the heats have shown a satisfactory elimination of phosphorus, and, as was to be expected, this elimination has been shown to depend upon the composition and condition of the cinder, and the manipulation of the bath during the period before the iron comes to nature. Some elimination of sulphur has been shown, but as a general rule this element should be kept as low as possible in the iron charged. Those heats which have been made with iron taken directly from the blast-furnace have shown the special advantage of such a practice in this respect. The cinder used has a normal composition of about sulphur 0.30, phosphorus 1.73, and silica 20.00. Ordinary roll scale was used for the additions. The weight of pig iron charged has generally been between 3,000 pounds and 4,000 pounds, although some heats as low as 2,500 pounds have been made, the average being 3,500 pounds. The weight of cinder has varied considerably, but it has been shown that about 500 pounds per ton of iron (22 to 25 percent) is the proper amount. The amount of scale used has run from 350 pounds to 550 pounds, and depends entirely upon the individual characteristics of the heat, such as the character of the pig iron, the temperature of the bath, etc., just as it does in the ordinary process.

"The time required to make a heat has, of course, varied very much, especially at first, running from 24 to 102 minutes. The average duration is 48 minutes, but it is believed that 40 minutes for a 4,000-pound charge will be the average under regular running conditions. This would mean from 15 to 18 heats per turn of 12 hours, or a product of from about 27 to 32 tons of rolled slabs or blooms. While some heats have shown a loss and others a gain between pig and slab, the indications are that the weight of the rolled slab will be about equal to that of the pig iron charged, or will only slightly exceed it. The loss from slab to finished plate, however, runs between 5 and 6 percent, thus coming close to that of steel. The difference is largely due to the fact that the iron is heated to a higher temperature, with a consequent higher heating loss. This difference in finishing loss is, however, more than compensated for by the fact that all of the iron made is in the slab, there being no crop-ends such as are necessary when steel slabs are rolled from ingots. The loss from pig iron to finished plate is, therefore, from 5 to 6 percent in this process, while in the ordinary puddling process it is about 16 percent.

"The physical tests made on this material show better results than those from plates of similar analysis made from ordinary puddled iron. For instance, the samples shown from plates containing sulphur 0.016, phosphorus 0.10, and carbon 0.05, give an ultimate strength of 51,000 pounds per square inch, with an elongation of 24 percent in 8 inches; while that from a plate containing sulphur 0.019, phosphorus 0.13, and carbon 0.10, gives an ultimate strength of 62,000 pounds per square inch, with an elongation of 23 percent in 8 inches. The latter is a material which may again open to iron the large field of shipbuilding. The above results, together with the entire absence of blisters, show the high grade of product obtained. It is, of course, somewhat difficult to estimate the probable cost in a properly-organized plant from data obtained in working a single machine under experimental conditions; but the indications are, and it is confidently believed, that slabs and billets will be produced at a cost not exceeding that of ordinary steel."

No further efforts will be made to consolidate the plants of the Cannon Metal Wheel Co., of Pontiac, Mich., with the Ypsilanti Mfg. Co., of Ypsilanti. The consolidation proposition called for the removal of the Cannon Metal Wheel plant to Ypsilanti.

Lake Superior Mining Institute.

Beyond doubt the most successful meeting of the Lake Superior Mining Institute was its eighth, held last week, in which Duluth was the starting point, while the itinerary covered the principal iron mining centers of the Mesabi and Vermillion ranges. There were more than 200 members and guests in attendance; yet the moving of this large party in the journeyings of three days, covering from 350 to 400 miles, was accomplished without a single mishap, with scarcely a delay, and with the utmost comfort to all on the excursion. The officers of the institute and the railroads leading to the mines worked indefatigably to make the trip successful and the outcome of their efforts is the most memorable series of inspection trips in the history of the institute.

The rendezvous was the Spalding House, at Duluth, on Tuesday, Aug. 19. For the afternoon of that day the program was a lake ride on the steamer Iroquois, the routes being through Duluth harbor basin and Superior bay to the lake by way of Superior entry. The return was through the Duluth ship canal to the dock of the Marshall-Wells Hardware Co. A delightful reception and smoker was given in the evening at the Kitchi Gammi Club, an enjoyable feature in addition to the musical program, being the French dialect stories of Hon. Peter White, of Marquette, the famous raconteur of the Upper Peninsula, and the narration of early personal experiences by Graham Pope, the well known veteran of the copper country.

Train was taken late in the evening and at 2:30 Wednesday morning the trip to the Mesabi range began, the train going in two sections, one of nine coaches, principally private cars of mining and railroad company officers, and the other comprising seven coaches. Among those on the trip were the following from Lake Superior districts:

Prof. C. K. Van Hise, Prof. L. W. Spinner, Dr. J. H. Crowell, G. G. Hartley, Prof. H. F. McNair, F. W. Denton, R. R. Trezona, W. J. Olcott, J. W. Kreitter, P. Mitchell, Dr. Chas. G. Shipman, J. Pengilly, T. Owens, R. Angst, C. W. Kieswetter, D. E. Woodbridge, W. A. McGonigle, J. C. Greenway, Walter Fitch, A. Fitch, W. H. Johnston, A. F. Harvey, N. P. Hulst, O. C. Davidson, Peter White, W. M. Duncan, J. E. Jopling, E. F. Brown, A. L. Flewelling, Chas. E. Lawrence, G. W. Youngs, E. W. Hopkins, M. B. McGee, W. J. Richards, Wm. Trebilcock, J. S. Wall, C. H. Hartley, N. B. Roscorla, L. N. Hardenburgh, G. H. Barber, J. H. McLean, Chas. Trezona, W. E. Upham, Prof. C. K. Leith, T. F. Cole, H. R. McCullouch, G. W. Smith, Graham Pope, Geo. A. Newett, O. W. Johnston, D. T. Morgan, Chas. C. Jones, John U. Sebenius, John Trebilcock, J. R. Thompson, Hon. Page Morris, Geo. D. Swift, Prof. F. W. Sperr, J. R. Van Evera, A. E. Seaman, Prof. A. W. Senter, Joseph Sellwood, J. A. Redfern, E. J. Longyear, R. M. Sellwood, Amos Shephard, Frank Drake, W. M. Jeffrey, E. E. Brewster, L. W. Powell, L. L. Prescott, H. S. Prescott, B. W. Jones, J. S. Mennie, R. S. Rose, J. F. Jackson, James Clancy, J. R. Adams, J. B. Cooper, Harry Hulst, G. R. Sheldon, G. L. Heath, Henry Truscott, John Champion, Kirby Thomas, A. W. Thomson.

Among those in attendance coming from outside the iron and copper countries were the following: G. F. Knapp, of Oglebay, Norton & Co., Cleveland; Wm. G. Mather, Cleveland Cliffs Iron Co., Cleveland; W. D. Van Dyke, Pewabic Mining Co., Milwaukee, Wis.; Arthur D. Willmot, Clergue Syndicate, Sault Ste. Marie; Franklin Mœller, Webster, Camp & Lane Co., Akron, O.; J. Parke Channing, Tennessee Copper Co., New York; Edwin Ball, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; H. S. Haselton, Pickands, Mather & Co., Cleveland; E. D. Brigham, Thos. S. Lynch, C. W. Melcher, David Evans, C. K. Sherman, R. B. Carter, A. B. Conover, and G. C. Bailey, of Chicago; A. I. Findley, Cleveland; John M. Sherrerd, Taylor Iron & Steel Co., High Bridge, N. J.; W. J. Johnston, New York; Wm. Wearne, New York; C. T. Wheeler, Pickands, Brown & Co., Chicago.

It was in March, 1895, that the institute made its last trip to the Mesabi range, and under conditions vastly different from those of today. Then the future of the new range was in doubt. Already there were signs of distress, the panic falling with double weight on those who had rashly gone in on the boom of the first two or three years. Besides this the season was unpropitious and the visitors were unable to see the steam shovels running that had been the talk of the entire region. The changes of the interval have been marked. The Mesabi range is today in strong hands and the trip of last week gave abundant evidence that its operations are being and will be directed by the best engineering skill the Lake Superior region has ever known, and that the policy now is to work these properties so that the last pound of ore shall go to market, every step in the winning of these ores having regard to the value of an entire mine and not merely to the immediate marketing of the more desirable grades.

One development of the informal discussion of Mesabi mining methods that was a running accompaniment of the two days' trip about these mines, is the even larger part that open pit mining will play in the working of this range in the future. It is now accepted by the best mining talent of the range that stripping is economical even up to 100 feet of surface, provided there is an equal depth of ore to be uncovered. It was said in the early days of the range that the Biwabik mine, with 30 to 40 feet of over burden, which entailed so great an expenditure before ore could be taken out, should have been opened up as an underground mine. The history of the property has vindicated the methods of the original owners.

Mention may be made here of another development in Lake Superior iron mining which may or may not be due to the control of so many iron mines by the steel corporation— the increasing employment of steel in mining construction work. The first steel shaft house, that was built on the Gogebic range, has been followed by a number, including among the latest the tall steel structure at the Savoy mine on the Vermillion range. Then two steel-lined shafts have been sunk at steel corporation mines—one at the Pioneer and one at the Norrie, and a third is proposed for the Chapin.

WEDNESDAY.

The first mine inspected was the Stevenson, on the extreme western edge of the Hibbing district, the trains reaching the mine early Wednesday morning. Having a wedge-shaped ore body to work, the management of this mine is hampered somewhat in getting its trains in and out and there is necessarily considerable waiting of the steam shovels, of which there are three in ore and two engaged in further stripping, all of the Barnhart type, manufactured by the Marion Steam Shovel Co., of Marion, O. The tracks already in have a grade of 2 percent. There is a large body of excellent ore and the mine will no doubt enter the 1,000,000-ton class this year. The ore runs 65 to 66 in iron and from .02 to .035 in phosphorus. Very large sales were made in 1900 and 1901 on 10-year contracts. The mine is owned by Corrigan, McKinney & Co., of Cleveland.

At the Mahoning mine, Hibbing, which was reached after a short ride, the party boarded flat cars on which a tour of the property was made. Its vast extent and the skill with which the various problems of operation were handled made it a special object of interest. Something of the extent of these workings may be gathered from the fact that there are 5 miles of tracks in this open pit. There are three distinct levels and the tracks, branching from the one at the entrance to the mine lead down in spiral form, with loops on the respective levels for the return of loaded cars. The grades are 3 percent and it is 150 feet from the surface to the bottom of the basin. There is yet 100 feet of ore below the lowest working level. A striking feature of this mine is its clean, trim appearance and the evidences of systematic, thorough handling. The location likewise is a model one in these respects, the houses of the men being all supplied with hot and cold water. The Mahoning is one of the dryest open pit mines visited on this trip, but it is dry at the expense of the Penobscot mine where the water of the district seems to center. In the beginning the Mahoning had considerable non-Bessemer ore and it still puts out a second grade known as Beaver, but substantially the entire product of the mine is now a Bessemer ore. Three steam shovels are at work in ore. A watch held by one of the visitors showed 4 minutes as the loading time for a 100,000-pound steel car, and this car load required 14 empty-

ings of the dipper. To many old-range mining men, accustomed to daily averages of from 2 to 4 tons per man, the performances at these Mesabi pits, much as has been said about them, were nothing short of astonishing.

The Penobscot mine near the Mahoning was to have been visited, but owing to a rainstorm this visit was omitted. The pumping plant at the Penobscot is its chief feature. The present level is 300 feet down and here the water must be handled at the rate of 5,000 gallons a minute. The pumping plant at the Penobscot mine was the object of an interesting paper read at the 1901 meeting of the institute.

The Hibbing district is now the scene of interesting developments and a number of new shippers will appear by next year. The steel corporation mines about Hibbing, including the Glen, the latest shipper, will produce about 2,000,000 tons this year. Pickands, Mather & Co., on their own behalf, as well as in conjunction with the Lackawanna Steel Co. in some cases and the Youngstown Iron Sheet & Tube Co. in others, have made a number of purchases that are noteworthy—the Utica and Albany in the Hibbing district and the Troy in the Eveleth district. At the Utica, formerly the Williams located just southwest of the Hibbing town site, the shaft has been finished, being down 122 feet, and drifting has been started. At the Albany, formerly the Maitland, located north of the town site, shaft sinking has begun. Southwest of Hibbing about 10 miles is the Crosby exploration, on which the Cleveland Cliffs Iron Co. has taken provisionally 18 forties, and is now working in five test pits. Adjoining the Crosby lands are the Kinney and Hawkins explorations, which the Deering Harvester Co. has acquired.

The Mountain Iron mine was the first stop of Wednesday afternoon. It was the first shipper on the range and carries the record for output, the total at the close of the 1901 season being 5,832,745 tons. Unlike the Mahoning, which is great in both length and breadth, the Mountain Iron has long and deep cuts from end to end; but unlike the Stevenson, loaded cars go out at one end and empties come in at the other. There has been at times some trouble from water at the Mountain Iron, but nothing recent, and the operation of the property has been steady throughout shipping seasons, some noteworthy steam shovel records being reported.

At the Fayal mine at Eveleth was found the variety of mining methods for which this property has been in repute—underground mining, open pit mining and milling. The ore body here is in the form of a horseshoe, with a shaft on either arm and two open pits and a third shaft on the curved portion. The No. 1 shaft commands the underground workings. Through the other two shafts the ore is raised after being trammed from open pit to the bottom of the shaft, or after being milled through raises into cars. No. 2 pit at the Fayal exemplifies the milling process modified to the extent that after the raises had been made and enough ore milled to give a cone of considerable extent a steam shovel was introduced, which loaded the ore directly into cars; these were trammed underground and dumped into the skip. The ore at the Fayal is overlaid immediately by 25 feet of paint rock, above which the surface is 65 feet. The shipments from the Fayal in 1901 were 1,656,973 tons, the largest season record yet made by a Mesabi mine.

WEDNESDAY EVENING.

The first session for the reading of papers was held at Vail hall, Eveleth, on Wednesday evening, upwards of 200 persons being in attendance. The president, W. J. Olcott, occupied the chair and briefly welcomed the members to the Minnesota ranges. He then introduced Prof. C. R. Van Hise, of the University of Wisconsin, whose work for the United States Geological Survey in the Lake Superior region has made him widely known. President Olcott alluded to the great value of Prof. Van Hise's work to the iron mining interests and to the obligation under which he had placed the industry in Minnesota. The assigned topic was "The Geology of the Lake Superior Region," but Prof. Van Hise confined his remarks to one department of the subject, namely, the construction of geological maps of the iron ore districts. He explained briefly the basis upon which the Geological Survey worked in indicating on maps the belts containing the iron-bearing formation. Early geological maps of the Lake Superior region, far from accurate, and yet affording much data to guide the explorer for ore, were shown, as were the various succeeding maps. The aim had been, the speaker said, to cut down materially the districts to which explorers need give any attention. The result of the work of geologists in this direction had been to cut down by 90 to 95 percent the districts in which explorations might profitably be made. In the case of the Mesabi range, Prof. Van Hise said, the lack of the out crops which had guided geologists in their work on other ranges was the great drawback. There were three rules, the speaker stated in conclusion, which might profitably be followed by explorers: 1. Confine explorations to the iron-bearing formation. 2. All iron ore deposits are bottomed by an impervious basement. 3. These impervious basements are in pitching troughs, though to this last the Mesabi range offered possible exceptions.

Use of Steel for Lining Mine Shafts.

Frank Drake, of Duluth, chief engineer of the Oliver Iron Mining Co., read a paper on "The Use of Steel in Lining Mine Shafts." It went with much detail into the experience of the Oliver Iron Mining Co. in the past two years in the use of steel instead of the usual timbering in lining mine shafts. The writer believes that the growing scarcity of timber, the gradual decrease that will ultimately come in the price of steel and the advantage of steel in durability and freedom from fire risk, will eventually force this subject on the attention of operators of underground mines. The first steel lining put in by the Oliver company was at the B shaft of the Pioneer mine, which has now been carried 862 feet from the surface, and steel lining has been employed the whole distance except in the 25 feet above the ledge where the usual timbering is used. This shaft is 6 feet by 17 feet 6 inches inside dimensions and dips at an angle of 70 degrees. It contains two hoisting compartments, each 6x6 feet, and a third, which is smaller, for ladderway and pipes. The common practice has been followed, of employing rectangular frames or "sets" placed at intervals with "studdles" extending longitudinally between them. The whole differs from ordinary shaft timbering only in the substitution of steel members for the timbers of the wooden lining.

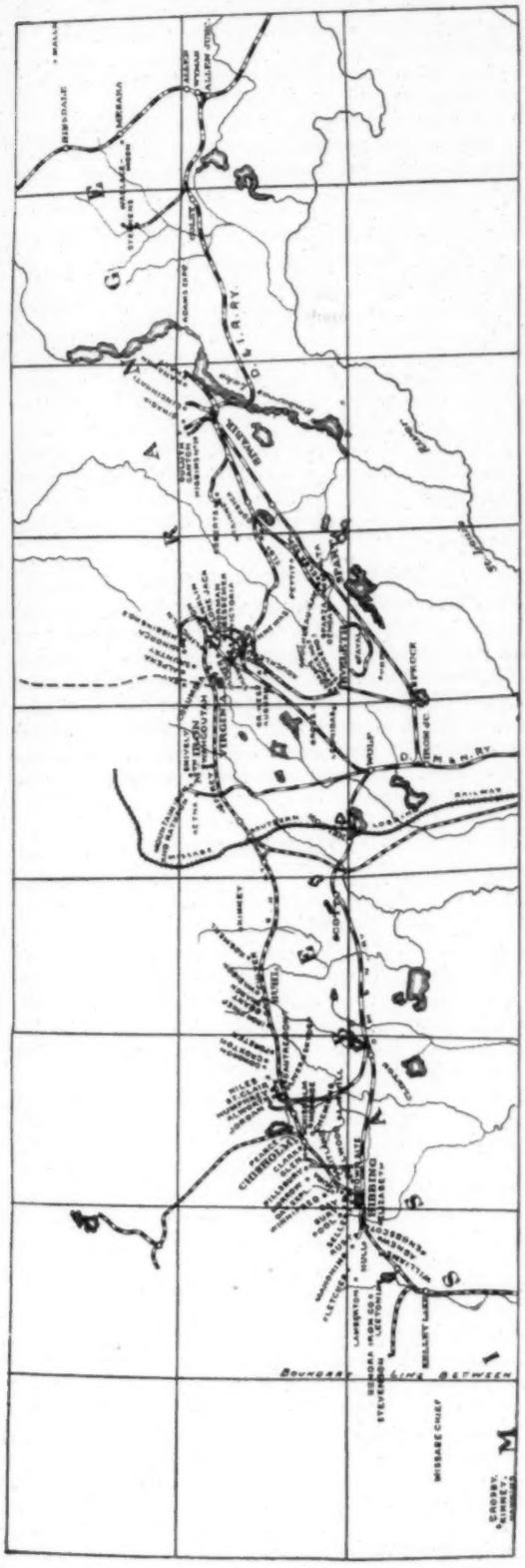
Besides the B shaft at the Pioneer mine, a steel shaft is being put in at the Norrie, and one is proposed for the Chapin mine. The Norrie shaft is 6x23 feet inside dimensions and dips at an angle of 58 degrees. There are two skip-compartments, each 6x6 feet, one cage compartment of the same dimensions and one compartment 4x6 feet for ladders, pipes and counterweight. This shaft is now down 670 feet and is lined with steel sets and wooden lath, except the portion between the surface and the ledge, about 20 feet, which is timbered in the usual way. The proposed Chapin shaft is 10 feet 4 inches x 23 feet 1 inch inside dimensions and contains two skip compartments each 5x6 feet, one cage compartment 5 feet x 10 feet 4 inches, and one compartment for Cornish pump ladderway, pipes and counterweight, 10 feet 4 inches x 11 feet 1 inch.

The paper was accompanied by elaborate drawings showing construction details of these various shafts and their steel linings. In discussing the effect on cost of the substitution of steel sets for wooden ones, Mr. Drake called attention to the reduced cost of excavation, because of the thinness of the steel members. In B shaft, Pioneer mine, the percentage of excavation saved was 22.5; at the Norrie mine, 21.5 percent, and at the Chapin mine, 14.5 percent. Reference was made in the paper to occasional damage to the steel sets in blasting, but this was not sufficient to require materially lighter charges, and therefore produced no particular retardation of the rate of sinking. At B shaft of the Pioneer this rate was 1.43 feet per working day, as against 1.54 feet at the Savoy shaft, where timbering was employed exclusively. Yet the slight difference was not necessarily due to the use of steel.

To make the Pioneer shaft more certainly fire proof it would have been desirable to use metal lath for lagging, but this considerably increased the expense. It was decided therefore to introduce sections of metal lath at intervals to the extent of four sets, or 16 feet, in every 100 feet of depth.

A comparison of the cost of a wooden lining for Pioneer shaft B, as gathered by data obtained from the sinking of the Savoy shaft, brought Mr. Drake to the conclusion that steel

sets, bearing members and chairs and the hangers, with wooden lath, would cost $8.55 a foot, while with 16 feet of metal lath in each 100 feet the cost would be $9.16. A wooden lining throughout would cost $5.73 a foot for the items specified. Thus the wooden lining costs $2.82 a foot less than the steel lining when wooden lath alone are used for lagging, and $3.43 a foot less than steel lining when sections of metal lath are



MAP OF THE MESABI RANGE, 1902. PREPARED BY THE MINING ENGINEERING DEPARTMENT OF THE LAKE SUPERIOR CONSOLIDATED IRON MINES.

introduced. There is to be considered, however, the saving in excavation already referred to, and the paper suggested in conclusion that with experience in using steel for linings its cost will yet be reduced materially.

In the discussion of the paper, in which Messrs. Kelly, Cole, Fitch, Thompson, Channing and others took part, the efficacy of a 16-foot all-metallic section in each 100 feet of shaft, as a protection against fire, was variously commented on.

New Changing House of West Vulcan.

The following paper was read by Wm. Kelly, manager of the Penn Iron Mining Co.'s mines on the Menominee range. It was illustrated by three views of the new structure—one exterior and two interior—and by a plan and elevation:

"The changing house at West Vulcan was designed with special reference to cleanliness, ventilation and the prevention of stealing. Individual lockers were considered the best means to prevent stealing and as some of the underground clothes are wet, provision had to be made for drying them. Boots should not be placed in heated lockers and it does not seem right to ask men to hang their street clothes in dirty lockers, so it was decided to provide each man with two lockers, a cool one for boots and street clothes and a heated one for mine clothes.

"To secure cleanliness, the principal requirements are a cement floor, which can be washed with a hose, and screens for the bottoms of the lockers. The simple way to heat lockers open at the bottom was to run steam pipes under them. By closing the tops of the lockers, the warm, ascending air is led into ducts passing through the roof, and ventilating currents are thus produced. The replenishment of pure air comes through windows and doors, some of which are kept open all the time. While a fan system of ventilation would undoubtedly be more effective than this "natural system," the latter has proved sufficient to carry away quite successfully the bad odor characteristic of such buildings.

"A common arrangement is to have lockers along the sides of the room with washing troughs through the center, but men washing to the waist, splash a good deal and disturb those who are dressing. For this reason a separate room for washing was provided. This is in a wing at the back, 30 by 20 feet with 10 feet studding. A wooden trough 14 inches wide, 4 inches deep, 18 inches from the floor, runs all around the room except across the entrance way. There are pipes for hot and cold water with numerous faucets. The men supply their own basins or pails which they keep in their lockers. A great many prefer to put their pails on the floor when they wash and they can spill and splash without inconveniencing others. There are 11 windows 5 feet from the floor and one in the gable so that there is an abundance of light and a man is below the line of vision from outside.

"In the main room there are 608 lockers, accommodating 304 men. They are 17 inches wide by 11 inches deep inside and 5 feet high. This is ample room for the street clothes, but for the mine clothes a depth of 14 inches or 15 inches would be better. Plank seats 12 inches wide run along the fronts of the cool lockers, approximately 18 inches from the floor. This is also the level of the bottom of the lockers. The bottoms, except of those against the wall, are of wire netting, which is also used to cover the tops. Wood slats form the bottom of the wall lockers and these lockers are covered with boards inclined at an angle of 45 degrees. The lockers are built of shiplap dressed on both sides. Several plans of arranging the lockers were considered but the one most economical of space is to have the entrance on the side of the building with a passage way or hall across it to the wash room, and to place the lockers in rows lengthways of the building. The aisles between the lockers are 5 feet wide. This gives only 15 square feet to each man to dress in if all of one shift dress together. Practically, however, this does not occur. Still, the aisles are not wider than necessary for men to pass. As there is no interior lining to the building, the studding were put in of dressed lumber 18 inches between centers and form part of the divisions between the wall lockers. A building 32 feet wide admits of the following arrangement as shown in the cross-section: A row of wall lockers for street clothes, with seats; aisle; double row of heated lockers; second aisle; double row of street clothes lockers, with seats; third aisle; second double row of heated lockers; fourth aisle and a row of street clothes lockers, with seats, against the wall again. This makes eight rows of thirty-eight lockers on each side of the hall, and with hall 8½ feet wide, requires a building 124 feet long.

"A 2-inch galvanized water pipe was laid about five feet below the floor line under the main hall to the wash room, with branches to each end of the main building and to the

small rooms beside the entrance. One length of 2 inch hose is attached to the pipe at one side of the hall. A 5-inch galvanized drain pipe with 2½-inch branches was also laid with the following openings in the floor: One in the center of the wash room, one in the center of each end of the main room and one in each of the rooms on either side of the entrance. The drain pipe has a trap near the discharge end made of 45 degree ells and nipples to keep the cold air out and prevent freezing.

"The building has a stone foundation and after the water and drain pipes were laid, the space between the wall was filled to within 6 inches of the floor line with fine rock from a waste dump near by. The building was then constructed with all the interior wood work before the cement floor was laid. The walls of the building consist of shiplap dressed on both sides, heavy tarred paper and siding. Studding 12 feet high admits of windows above the lockers in the main room. There are sixteen on each side and also nine in each end. The top ones are principally for ventilation and are arranged to open with a cord. The bottom row is only 2 feet from the floor and gives emergency exits from each aisle in case of fire. The rafters are 2 by 6 inches covered with shiplap, paper and shingles. The lockers, the walls of the wash room below the windows and the two small rooms at the entrance were painted drab with cold water paint and the upper part of the building white. The large number of widows and the white paint make a cheerful interior. The lockers are numbered with stencil figures.

"The small room at the right of the entrance was intended for the bosses' changing room, but it was not finished in time, and the large room proved to be so comfortable, that the former is used as a lunch room by the few men who eat in the building. The room on the left is entered only from the outside and has a window into the main hall. In it are kept the balls of "sunshine" which are handed out through the window to each man starting for the shaft. Stretches, mattresses and blankets are stored in this room.

"An electric bell near the front door can be rung from the shaft house. In the winter when a shift is going down, the conductor on the passenger cage, before each trip, rings for the next load of men. The right number go over to the shaft house to be ready when the cage comes up and are exposed as little as possible.

"A steam pipe comes in on the left end of the building above what may be called the ceiling joists, rising slightly to the center of the building, which is its high point. It is then distributed across both sides of the hall overhead, with branches downward at each row of lockers and at the small rooms back and front. Four rows of 1-inch pipe pass under the mine clothes lockers for constant use, and for additional warmth for the room in winter there are two rows under each seat in the main room and around the walls of the other rooms. All these pipes drain from the center to the ends of the building into traps, which throw the condensed water up into a 12-inch pipe laid on the ceiling joists. This serves as a storage tank and from it the hot soft water is distributed to the troughs in the wash room and to the other small rooms. Some trouble was experienced at first from unequal expansion in the long parallel pipes under the lockers and seats and this had to be arranged for by putting elbows and nipples at their lower ends. All the steam pipes are laid on iron brackets so as not to come in contact with wood. There is a pressure regulator in the machine shop from which the main heating pipe comes. Last winter a pressure of 35 pounds was carried, but this summer it was reduced to 15 pounds.

"As before indicated, the double rows of heated lockers are closed in on top, the covers rising as shown on the longitudinal section, to two ventilators each 2 feet square. The opposite ventilators from the two parallel rows are inclined to each other until they meet and unite in a box 3 feet square, which passes up through the roof. The exterior is painted with a bright red, mineral paint; trimmed with yellow ochre. The sash are painted white. Type-written rules are framed and posted in the building.

"The following rules are made for the purpose of keeping the changing house in order and avoiding risks of fire:

"Every man is to have two lockers, one for street clothes and the one opposite for dirty clothes.

"Dirty clothes must not be put in clean lockers.

"No one is allowed to put locks on lockers until assigned by the 'dry man.'

"'Dry man' is to keep names of men and lockers they occupy.

"Miners' lamps must not be carried in and out of the building burning.

"No smoking allowed, nor pipes left in clothing.

"Caps, fuse and powder must not be taken into the building.

"Hats, boots and clothing left outside lockers will be disposed of by 'Dry Man.'

"'Sunshine' must be put in barrel and not left in lockers.

"'Dry man' is required to enforce the rules.

"There will be no charge for use of changing house."

"The cost of the building, foundations, piping, painting, everything complete, was $2,823.77, or $9.29 per man accommodated."

In the discussion of Mr. Kelley's paper J. Parke Channing asked whether it was proposed to put in shower baths, and it was answered that it was not believed a shower would be used by the men. Mr. Channing stated that in a changing house built at the Burra Burra mine of the Tennessee Copper Co. shower baths were provided and were very generally used. In this connection mention may be made of a new changing-house under construction at the Barnum mine on the Marquette range, in which shower baths are provided, as well as a room in which the men can eat their lunch. It is evident from the informal discussion over Mr. Kelly's paper, outside the regular session, that arrangements for the comfort of the men are to be more generally provided at Lake Superior mines than heretofore.

Details of an Air Compressor.

The last paper of the evening was by J. Parke Channing, and briefly detailed the dimensions and performance of a Nordberg air compressor installed at the Burra Burra mine of the Tennessee Copper Co. The piston speed was 630 feet; steam pressure, 150 pounds; vacuum, 26 inches; discharging temperature, 240 degrees; i. h. p. for the steam cylinder, 293; for air cylinder, 278; efficiency ratio between steam and air ends, 95 percent. The steam consumption per indicated horsepower was 15 pounds.

THURSDAY.

Thursday's mine inspections began with the Biwabik mine, a half hour's run from the Fayal. The Biwabik is an interesting property, partly from its history and partly from the extensive amount of stripping required to open it up for advantageous operation. There are three forties, estimated a few years ago to have on them 25,000,000 to 30,000,000 tons of ore. The average depth of the over-burden is about 30 feet and the average thickness of the ore about 75 feet. The Biwabik was the second mine on the Mesabi range to send out ore and its record of total shipments is fourth, at 3,430,604 tons. The three forties are so opened up that the mine tracks make a complete swing from the original west cut to the east cut, and there is no interference of incoming and outgoing trains. There are now three shovels in ore and preliminary blasting is employed to make the work of the steam shovels the speedier. In the northwest portion of the deposit where the principal shipments are now being made, lumps of very considerable size are encountered and the mine has the distinction of employing the only crushing plant on the Mesabi range. The ore after it is loaded into mine cars is carried up an incline, traversed by two tracks for cars in balance, and dumped into a No. 9 Gates gyratory crusher. The crushing is done between a cone placed on a gyratory shaft vertical through the center of a cylindrical shell. The surface of the cone when in motion is constantly receding from and approaching the sides of the shell, and thus there is cross-breaking of the lump, instead of the direct crushing in the jaw breaker. The top of the shaft carrying the crushing cone is secured, while the bottom is gyrated, with a certain amount of eccentricity, by means of a simple gearing. The cylindrical shell is made up of manganese steel concaves, and the crushing cone has a heavy mantel of manganese steel. The capacity of the crusher is about 1,400 tons in 10 hours, but the mining and car handling operations in connection with this lumpy ore have not yet been at a speed at all testing the capacity of the crusher plant. After being crushed

to six inches the ore passes over a screen with 1½-inch holes, and the coarse ore separated.

The Ely Group of Mines.

The itinerary for the remainder of Thursday took in a noteworthy group of mines—the Chandler, Pioneer, Zenith, Sibley and Savoy, all in the Ely district, and within a stretch of 1½ miles on a line running a little south of west, and all to the north and northeast of the town site. That there is a continuous trough-shaped ore formation pitching from the Chandler on the west toward the Pioneer and approaching the surface in the vicinity of the eastern members of the group is indicated by the operations thus far carried on. However, the ores of the Sibley, Savoy and Zenith differ from those of the other two mines. The Pioneer ore shows more paint rock and is therefore redder. The Zenith of the three most recently opened properties produces the best ore, the average of the 1901 analyses showing 64.66 in iron and .037 in phosphorus. The visitors were particularly interested in the Savoy shaft house and the power plant at the Sibley. The shaft house is of steel and is 160 feet high, the unusual height being with the purpose of carrying the cages above the skip and to give ample head room. A new steel shaft house will also be built at the Sibley. The plan is to do the hoisting for both mines from the new plant now under construction at the Sibley. From the hoisting drum to the bottom of the Savoy shaft, now down 760 feet, will be 3,800 feet, and for hoisting in balance there will be required 7,600 feet of rope. The rope passes over numerous idlers and a large angle sheave for the Savoy haul, while the 2,000 feet of rope leading from the second drum to the Sibley shaft, which is down 630 feet, will be direct wound. The hoisting plant now being installed is furnished by the Sullivan Machinery Co., of Chicago, and consists of two 10-foot drums. The engine cylinders are 28x60 inches. Several novel features are provided, chief of which is a device for shutting off steam after a trip has been made. This is automatic in operation and as it shuts off the steam when the skip or cage is below the collar of the shaft, the danger from overwinding is eliminated. The momentum of the skip will carry it up the desired height but it will be impossible for it to run up into the sheaves of the shaft house. The engineer is compelled to reverse before he can start again and the cage that has been hoisted is bound to come down. In case the skip or cage should not be carried up of its own momentum after the automatic shutting off of steam, the engineer touches the foot lever controlling a by-pass and supplies the required power. Another safety provision is a storage tank for steam and one for compressed air. In the event of a boiler explosion or the failure of the air compressor for any reason, the brake can be applied or hoisting can be completed by recourse to the storage auxiliary. A further safety provision is a lever turning a target so that the operator always knows which skip is up. The compressor plant for the Sibley and Savoy will be brought from the Tilden mine. It is a 40-drill single stage compressor with compound steam end. The boiler plant consists of four 150 horsepower boilers built by the Northwestern Iron Works. They will be hand fired. The stack will be 123 feet high.

The Pioneer mine was the first on the trip at which any considerable party went underground. The 10th level is the scene of the present operations, and is 925 feet from surface. The shape of the lens is such that the workings become more extensive as the depth increases, and the layout on the 10th level is calculated to secure a large present product and its removal at a minimum of cost. There are three sub-levels between the 9th and 10th, and under the caving system employed in this mine 116 feet of ore will come through the chutes between the 9th and 10th levels, in addition to 30 feet of ore above the 9th level. Electricity is the tramming power and has proved eminently satisfactory and economical. The output of the mine in July was 57,625 tons, with a working force of about 500 men. The new No. 2 shaft of the Pioneer which is going down in the greenstone of the foot wall has reached a depth of 862 feet, and at the proper depth connection will be established between the two shafts on the 10th level. The new shaft was inspected by a number of the visitors, as it is here the steel lining is being put in as described in a paper at the Eveleth session. The Pilot, or crushed ore of the Pioneer mine, is one of the choicest on any range, running 66.48 in iron last year and .034 in phosphorus.

It is interesting to note that the ore from the Sibley, Savoy, Zenith and Pioneer mines will eventually be crushed at Two Harbors, where a single crushing plant steadily operated will economically crush the product of all. A conveying plant will also be installed to take the ore from the crushers to the docks.

The impression received in this tour of the Ely properties was one of the broad, foresighted policy which is displayed in the handling of these important mines of the steel corporation. The improvements now under way, with the sinking of one more shaft, comprehend all the important work that will be necessary in the entire lifetime of the group, and from calculations made as to the extent of the ore bodies the future should yield pronounced economies in the removal of the ore.

WEDNESDAY EVENING.

The concluding session for the reading of papers was held in the Finnish Temperance Hall at Ely on Thursday evening. The first paper, and one that may lead to practical steps in the not distant future, was by Dr. Nelson P. Hulst, of the Oliver Iron Mining Co., on

"Moisture in Lake Superior Ores."

It was as follows:

Of the 20,589,393 tons of iron ore shipped from the Lake Superior region in 1901, it is to be noted that 88 percent was of the variety we call soft hematites. If the Chandler and Pioneer products are classed with the soft hematites, then 94½ percent of the total product of 1901 shipped from the Lake Superior iron mines was of this variety. All of the soft hematite ores carry a considerable percentage of moisture. In the very complete list of cargo analyses for the season of 1901, we find the product of one mine carrying moisture in its two grades of ore of 17.12 percent and 16.24 percent respectively. This list of cargo analyses shows that some 30 different grades of ore carry moisture exceeding 12 percent of their weight. In addition there are some 62 other grades of ore in the list which contain moisture from 10 percent to 12 percent of their weight. The amounts shipped of these high moisture ores are as follows:

Containing 12 percent and above	3,356,242 tons
Containing 10 percent and up to 12 percent	6,077,737 tons
Total	9,433,979 tons

or practically 46 percent of the entire shipments of ore for 1901.

It has been found that it would not be advantageous to remove all of the moisture from a soft hematite prior to shipment, because of the dust losses which would ensue in handling from mine to furnace, and on account of annoyances from dust in handling. Some experiments that have been made show that several percent of moisture should be left in ores, these percentages to be left varying with different ores in order to prevent dust losses.

For Norrie ore	4 percent moisture should remain
For Tilden ore	5 percent moisture should remain
For Mountain ore	6 percent moisture should remain
For Chandler ore	2 percent moisture should remain

Assuming that these experiments give reliable data to proceed from, then the fine grained Mesabi ores, like that of the Mountain Iron mine, and several others which contain between 12.46 percent and 15 percent moisture, can allow the removal of 6½ to 9 percent of moisture, while the fine grained dusty ores of the Mesabi Range may require 6 percent moisture to prevent dustiness in handling. Some of the Mesabi ores, and probably all of those of other ranges containing 10 percent and 12 percent moisture, being of coarser physical structure, will not require more than 4 or 5 percent moisture to be left in them to overcome dust losses in handling.

It may be stated with considerable confidence that 5 percent of moisture may be without detriment removed from quite all of the soft hematites carrying 10 percent or more of moisture where the physical structure of such ores show a more or less coarse grain. Will it pay to remove some 6 percent of moisture from the class of ores I have named? If so, in what direction will the gain be made? Primarily, the saving would be in the freights. While I am not fully informed as to the freight from Lake Erie to furnaces, the following figures

approximate correctness, or are sufficiently so for our calculations:

MESABI RANGE ORES.

Rail freight from mine to Lake Superior	$0.80
Vessel freight from upper lake docks to Lake Erie	.75
Rail freight from Lake Erie docks to furnaces	.80
	$2.35

GOGEBIC RANGE ORES.

Rail freight from mine to Lake Superior	$0.40
Vessel freight from upper lake docks to Lake Erie	.75
Rail freight from Lake Erie docks to furnaces	.80
	$1.95

MARQUETTE RANGE ORES.

Rail freight from mine to Lake Superior	$0.25
Vessel freight from upper lake docks to Lake Erie	.70
Rail freight from Lake Erie docks to furnace	.80
	$1.75

Six percent of the moisture removed would save 6 percent of the freights, which, for the high moisture ores of the ranges named, figure out as follows:

Mesabi	14 1-10 cents
Gogebic	11 7-10 cents
Marquette	10 5-10 cents

Other probable gains would result from the partial drying of ores, viz.: greater ease in unloading cars or dock pockets; reduced dust loss in furnaces, since the volume of steam driven out of these ores, constituting part of the furnace burden, would be diminished in proportion as the moisture is diminished; reduced fuel required for smelting, due to a smaller amount of water to be evaporated from the ore charges. Neglecting altogether these indefinite and possibly uncertain savings, we may base our calculations only on savings arising from freighting 6 percent less tonnage of ore. The actual gain would be represented by the difference between the sum saved in freights and the cost of the removal of the required amount of moisture.

This cost of drying the ore to the required percentages of moisture will be made up of fuel, labor, wear and tear of plant, interest and cost of installation. In correspondence had with a firm engaged in building dryers for varied purposes (which firm has had years of experience in such work), they guarantee that dryers of their construction will evaporate 10 pounds of water to the pound of fuel used. On this basis, the removal of 6 percent of moisture from one ton of iron ore would require the expenditure of 13.44 pounds of coal. On account of freight, only the best coal is economical at the mines. This may be figured to cost $3.50 per ton. Therefore, the fuel cost to remove 6 percent of moisture would be 2.51 cents per ton. Labor cost would be 1 cent per ton; interest and repairs, 7 mills per ton. A change of 1 cent per ton would sink the cost of the drying plant in four or five years. I should state that the items of fuel, cost of labor and of interest and repairs were given me by my correspondent, the Cummer Dryer Co., of Cleveland, O. We have no reason to doubt their correctness. The above items make a total of 4.58 cents per ton. Adding 1¾ cents per ton for fuel for engine rotating the dryers, engineers and cost of bringing the ore to the dryers, and contingencies, and we have 6.33 cents per ton as the total for removing 6 percent of moisture from ores under consideration. In a plant of magnitude equipped with labor saving appliances, I should expect that the cost of drying might be brought down to 6 cents or less per ton. Summarizing the foregoing data, we have

Saving of freight on Mesabi ore, 41.1 cents per ton; cost of drying, $0.0633; gain, $0.0778.
Saving of freight on Gogebic ore, 11.7 cents per ton; cost of drying, $0.0633; gain, $0.0537.
Saving of freight on Marquette ore, 10.5 cents per ton; cost of drying, $0.0633; gain, $0.0417.

The soft hematites of the Marquette and Gogebic ranges carrying high moisture might without detriment have 7 percent of moisture removed, so that the gain resulting from drying them would be about the same as with the drying of the Mesabi high moisture ores. Even should freights go lower than the figures in my computation, reducing thereby my estimated gains, still there is good reason to feel confident that at least 5 cents per ton saving may be secured by a partial drying of the high moisture ores.

In order to secure this saving it would be necessary to keep the ore thus dried continually under shelter, from the time it leaves the drying plant until it reaches the furnaces. This would involve expenditures on the part of the railway companies, both on their car equipment and on their docks. Expenditures would also be necessary at the underground mines to provide shelter for ores dried during the winter months, or when not shipping. But for the railroads as well as the mines, the dryer ore would cost less to handle. With protection to laborers from the weather, there would be no rainy-day layoffs to disorganize the working forces.

Experiments have demonstrated that ore dried, or partially dried, absorbs only a fraction of 1 percent of moisture from the atmosphere for a long period of time when under shelter.

Only a very few years ago the varying moisture in the soft hematite ores did not have recognition to the extent of affecting their market values. Today, however, the buyer takes closely into account the moisture an iron ore contains, and he imposes penalties on the mine operator in case the average of moisture in the season's shipment of his ore exceeds the guaranteed percentage. For his guide in buying, the purchaser of Lake Superior ores can now consult an annually published and complete list of average analyses of all cargo shipments of every grade of ore shipped during the previous year. This list of analyses gives not only the percentage of moisture each of the different grades of ore contains, but it also gives the exact percentage of iron an ore in its natural condition contains, as well as the percentage each iron ore contains when dried at 212 degrees F.

That the problem of partially drying ores is one well worth profound consideration, is seen from the foregoing. Five cents per ton, if saved on the 1901 tonnage of such high moisture ores as I have cited, viz., 9,433,979 tons, would have amounted to $471,699.

In the discussion on Dr. Hulst's paper, Mr. Shephard suggested that an additional economy would be in the amount of royalties paid, these being based on railroad weights. With moisture partly removed at the mine there would be a proportionate reduction in the royalty tonnage. Questions were raised as to the re-absorption of moisture from the air, after drying, and it was shown that this was very slight where the ore was protected from rain. It was suggested that tarpaulins could be employed to cover the ore in the cars; and the feasibility of roofing over the docks at upper lake ports was pointed out. The railroads would not necessarily be averse to this, it was stated, as shelter for the men would save much working time on rainy days.

The Mine Machine Shop.

The second paper was by J. F. Jackson, representative in the copper country of the Wisconsin Bridge & Iron Works. The laying out and maintenance of a mine machine shop was described as follows:

With the advent of better prices for copper which were enjoyed by Houghton county mines two or three years ago, came a desire on the part of mine superintendents to carry out plans for betterments in the several departments. Since that time many new buildings have been constructed; great hoisting engines and compressors have been put in operation; new tools and appliances purchased; and up-to-date boiler plants installed. Most of the mines in the district have succeeded during this period in securing such a high grade of equipment that material economies in operation can be expected now that low prices prevail.

The purpose of this paper is to describe in a few words the general lay out of a machine shop suitable for a mine running from 50 to 150 drills. This plan has been developed in the copper country as the result of study and a general desire on the part of several engineers and master mechanics to incorporate a little of twentieth century progress in the small machine shop. It is generally understood that a modern manufacturing plant of almost any sort must be equipped with many labor saving devices, among the most important of which are various sorts of cranes, trolleys, derricks, etc., by means of which materials can be handled to various parts of the shop

with a minimum loss of labor and time and a maximum of general convenience. The gospel I proclaim is that it is possible and economical for the small power plant or the modest machine shop to be equipped at small expense with overhead contrivances which are so simple and convenient that you will wonder why they are not installed by everybody. I will now endeavor to illustrate my proposition. [The speaker showed on the blackboard a general cross section indicating the lay-out of cranes and trolleys adopted by three of the large mines in the copper country.] In two cases it was built 60 feet wide and in one case 40, but the principle is the same in all. In the machine shop of the Champion Copper Co., 60 feet in width by 146 in length, there is a basement of 48 feet length at one end for storage of castings, spare parts and other materials. Access to this is had by doors, trap doors, etc., directly from the shop. A railway track is laid through the building crosswise at one end of this basement near the center of the shop. Materials may be loaded to and from the cars directly to or from the basement or main shop.

The line shaft is placed well towards the peak of the roof and countershafts are located as convenience requires at each side of the central crane. The heavier lathes and other tools are located longitudinally on each side of the central aisle, and are therefore readily served by the overhead crane. This is a hand power crane of 10 tons capacity. With this crane and an ordinary chain hoist one man can pick up a casting or piece of shafting weighing three to five tons and walk with it from one end of the shop to the other or place it on any machine tool within reach of the crane. The tracks at each end of the crane are provided with roller bearings. Two of the wheels are connected rigidly to a shaft which is operated by a chain or a chain wheel. The roller bearings reduce the friction so much that it is surprising how easily and quickly heavy loads may be handled about the shop by one man.

In an ordinary mine machine shop it is seldom necessary to handle pieces weighing more than five tons. With this apparatus, however, heavier pieces up to ten tons may be handled expeditiously by two or three men. You will also note that it would be perfectly feasible to apply electricity for the purpose of hoisting and traversing with this crane, and to manipulate the whole contrivance from the floor of the shop, should the volume of work demand quicker operation. In the 40-foot building there is only room for one row of heavy machine tools each side of the central isle. In the 60-foot building there is usually room for one row of heavy and one or two rows of light machines each side of the aisle. The heavy lathes, planers, drill presses, etc., are of course placed at the end of the shop which has the solid floor, while the lighter machines are located over the basement portion of the building.

Near the work benches on each side of the building is a seven or eight inch I beam trolley track suspended from the roof trusses. This carries a 2-ton trolley and is for handling light castings, etc., and is particularly convenient for handling rock drills. The repaid stands for drills are directly under the trolley and one side of the shop is usually given up to that specialty. This general scheme may be modified in many ways to meet individual requirements. In the engine or compressor house a cheaper I beam trolley crane may be suspended from the roof trusses, and will be found a time and money saver when machinery is being installed or repaired. A tool room is located in a corner of the building. An office about 16 feet square for the superintendent or master mechanic is built over the tool room and reached by a short stairway. The building is well lighted and ventilated from the sides and ends as well as by the large monitor on the roof. The shop engine may be placed in one corner of the building.

The equipment of a shop of this sort for a mine operating 50 to 100 ordinary drills may consist of the following: 6 or 8 lathes of various sizes, 2 shapers twenty-four inch, 2 planers of moderate size, 2 radial drills, 1 drill grinder, 2 emery grinders, 1 boring machine, 1 universal milling machine, 1 pipe machine. This equipment will vary according to individual needs. I do not think it necessary to enter into a minute description of the features of this general lay out, but invite you to give it your careful consideration, believing that I have sufficiently demonstrated that any mine machine shop or power house may be readily equipped with overhead contrivances which will afford most of the practical conveniences enjoyed in the large shop equipped with a "high toned" electric crane. From the simplicity of the construction I think it will also be sufficiently evident that the cost of securing these conveniences will be very low indeed.

Comparison of Mesabi and Gogebic Ores.

The third paper was by Dr. C. K. Leith, of the University of Wisconsin, on "A Comparison of the Development of the Ores in the Mesabi and Gogebic Districts." As was the case with Prof. Van Hise's paper of Wednesday, Prof. Leith had marked attention from the institute, and the prominence thus given to the work of the geologist in locating and demarking iron bearing formations, indicates, with other things, that scientific investigation appeals more and more to the operators of mining properties. Prof. Leith brought out the fact that the iron formations of the two ranges belong to the same geological series, and called attention to the belief of some authorities that the origin of the ores in the Mesabi and Gogebic ranges is essentially the same. The process involved in the laying down of these ores he regarded to be the oxidization of the original iron carbonates and the segregation of the silica contained in the iron carbonates. The action of percolating water in depositing the ores in the gently pitching troughs of the Mesabi formation was explained at some length.

New Officers.

A brief business session followed the reading of the papers. Secretary Yungbluth read a statement of the finances for the year. Receipts were $2,418.18, and the amount on hand is $1,538.08. There is a membership of 260 who have paid their dues, which added to 37 delinquents makes a total of 297. The report of the council's meeting was read. It recommended that Dr. C. R. Van Hise be elected an honorary member; that 104 new applicants whose names were read be admitted to membership; and that the secretary's salary be increased from $100 to $500. All these recommendations were adopted.

The report of the nominating committee was presented through its chairman, W. M. Duncan, and the following were elected:

President—Walter Fitch, manager Champion Iron Co., Champion, Mich.

Vice Presidents—H. F. Ellard, Ironwood; W. H. Johnston, Ishpeming, Mich.; Fred Smith, Allouez, Mich.

Managers—Graham Pope, Houghton; T. F. Cole, Duluth; Amos Shephard.

Treasurer—Geo. H. Abell, Hurley.

Secretary—A. J. Yungbluth, Ishpeming.

The meeting adjourned sine die after votes of thanks to the railroads, the local committee, the Kitchi Gammi Club, of Duluth, and others.

FRIDAY.

The Soudan properties of the Minnesota Iron Co. were visited on Friday morning, and the changes noted in the interval since the 1895 meeting. The surface property and the location appeared to be in excellent shape. The crushing of the hard hematites produced here is accomplished by the use of jaw crushers. The refractory character of the ore also makes an extra demand on the machine shop and blacksmithing departments, both of which are well equipped. Hand and air hoists and jib cranes are employed to good advantage in the machine shop.

The proposed stop at Two Harbors had to be omitted on the run to Duluth, and the latter point was reached in the early afternoon, the members scattering on the various evening trains.

Obituary.

Chas. H. Curtis, vice president of the J. M. & L. A. Osborn Co., Cleveland, died Aug. 24, from smallpox, aged 40 years. Mr. Curtis was formerly of Niles, O., where he was engaged in business for years under the name of the Curtis Roofing Co. Later he was connected for a short time with the Curtis Sheet Steel & Corrugating Co., of Zanesville, O. He had been with the Osborn company about four months.

The plant of the American Tin Plate Co., at Lisbon, O., has been shut down for an indefinite time.

PERSONAL.

Charles F. Scott, of the Westinghouse Electric & Mfg. Co., has returned from England.

President Chas. M. Schwab, of the United States Steel Corporation, sailed Thursday for Europe.

John Fritz, one of the best known engineers in the country, was highly complimented on his 80th birthday, Aug. 20, when some 300 of his friends, embracing representatives of the government, presidents and professors of colleges, famous engineers and iron and steel makers from all parts of this and foreign countries, lawyers, clergymen and old neighbors, met in the opera house in South Bethlehem, Pa., to honor him for what he had accomplished as an engineer and for his life, which, busy to an unusual degree, had time, nevertheless, in which to be courteous to the most lowly, and to give aid, comfort and sympathy to the unfortunate and poor. Mr. Fritz designed the plant of the Bethlehem Iron Co. and was from 1860 to 1893 its chief engineer. He is still active as a consulting engineer.

Fred H. Colvin, of the editorial staff of *Locomotive Engineering* and formerly of *Machinery*, has resigned to accept the presidency of the Derry-Collard Co., 256 Broadway, New York, and will undertake the publication of technical and educational books, charts, etc., on a novel plan.

George J. Record, who in 1882 established the Record Can Co. in Conneaut, O., which has since been absorbed by the American Can Co., has tendered his resignation as manager of the Conneaut branch. C. T. Draper, of the Cleveland branch will also take charge of the Conneaut branch.

David Reese, formerly connected with the Griffith Charcoal Iron Works, Washington, Pa., has been appointed assistant superintendent of the sheet mills of the Laughlin Nail Works, Wheeling, W. Va.

Morgan Evans has been appointed superintendent of the 8-inch continuous guide mill at the lower works of the American Steel Hoop Co., Youngstown, O.

Ben Williams has been appointed superintendent of the 16-inch mill of the Republic Iron & Steel Co., at Ironton, O.

The rumor of the resignation of Superintendent F. H. Treat, of the South Side plants of the Jones & Laughlin Steel Co., Pittsburg, has been officially denied.

The resignations of Messrs. Gates, Mitchell, Blair and Lambert from the board of the Colorado Fuel & Iron Co., of Denver, Col., have been sent to the headquarters of the company.

On Thursday evening, Aug. 28, Col. F. J. Hearne, who recently retired from the presidency of the National Tube Co., will be given a dinner at the Duquesne Club, Pittsburg, by his former associates in the company.

Ex-Judge J. H. Reed, a director of the United States Steel Corporation, and a party of Carnegie Steel Co. officials, left Pittsburg this week for the Yellowstone National Park. The party will also visit British Columbia.

J. K. Robinson, of Iquique, Chile, who represents the interests of the Westinghouse Electric & Mfg. Co. on the west coast of South America, sailed home from New York this week.

F. H. Dietz, formerly cashier of the Bassett-Presley Co., Cleveland, has been promoted to the position of secretary and treasurer of the company, succeeding the late George Presley. G. F. Bassett, of New York, has been appointed to succeed Mr. Dietz as cashier.

E. F. Du Brul, who has been acting commissioner of the National Metal Trades Association for several months, has accepted election by the administrative council to the position of commissioner. He has made arrangements with the Miller, Du Brul & Peters Mfg. Co. to retire from active connection with it, though he is still a director and vice president of the company. Mr. Du Brul is also first vice president of the National Metal Trades Association.

The new Algoma Navigation Co., of Toronto, has ordered a new passenger vessel from the Bertram Shipbuilding Co. The new steamer will cost about $110,000, will be constructed entirely of steel and will be 190 feet in length by 34 feet beam.

The American Iron & Steel Mfg. Co., Lebanon, Pa., started a portion of its rolling mills with negro laborers. The plant has been idle since May 1, on account of a strike of the puddlers.

BRITISH IRON MARKET.

The London *Iron and Coal Trades Review* comments as follows on the iron trade situation:

"There have been few new developments in the iron and steel trades during the past week. The demand continues only moderate in extent all round, but the general level of prices is maintained. There is, perhaps, more doing in the pig iron than in the manufactured branches, and prices of raw materials are better supported; but East Coast hematites are very weak, despite the business being done with the United States. The outlook in the British iron and steel industries is, on the whole, considered fairly encouraging, in view of the continuance of the American demand and the probable improvement in the near future of home business and prices; but, on the other hand, there are the reported importations of Russian pig, and the possibility of Canadian iron coming over here when there is a cessation of shipments from the Dominion to the United States to be taken into consideration. At present the markets across the Atlantic present no new phases, and the scarcity of pig being very considerably increased by the difficulty of getting adequate supplies of coke, it is probable that imports from this country and elsewhere will remain on the present large scale for some time to come at any rate. Continental trade is not very active. The German works appear to be more actively employed than those of France and Belgium, the export prices of the former being cut so low as to make competition difficult.

"The home demand for pig iron remains rather slow; but British makers are still supplying American requirements, which help to support the market. In the Cleveland district foundry qualities, which are mostly in request for shipment, have not only maintained their ground, but have stiffened slightly, being in somewhat short supply. For No. 3 the general price has been 51s. 6d. per ton, and fully 53s. 9d. has been obtained for No. 1. The firmness in ordinary Cleveland pig, however, does not extend to the hematite trade, makers on the East Coast finding themselves in a position the reverse of satisfactory. Owing in the main to the slackness in the local shipbuilding industry, they are compelled to accept about 57s. for mixed numbers, or at least 4s. less than the price of similar iron on the West Coast, where producers are not so much affected by any falling off in the market for marine material. Lancashire makers are quoting about 59s. 6d., less 2½ for No. 3 foundry, delivered Manchester, their advance to 60s. having proved little more than nominal, while Lincolnshire makers are asking 54s. 6d. to 55s. net. Derbyshire foundry, which remains scarce, is not quoted under 57s. to 58s. net, delivered Manchester. The Millom & Askam Iron Co., Cumberland, recently contracted to supply several thousand tons of hematite pig iron for shipment to the United States."

The Iron and Steel Institute.

For the Düsseldorf meeting of the Iron and Steel Institute to be held Sept. 3 and 4, with trips on other days to the Dusseldorf Exhibition, the following is the list of papers:

"Iron and Steel at the Düsseldorf Exhibition." By Professor H. Wedding, honorary member of the Iron and Steel Institute.

"The Progress in the Manufacture of pig iron in Germany since 1880." By W. Brügmann, Dortmund.

"The Progress in the Manufacture of Steel in Germany since 1880." By R. M. Daelen, Düsseldorf.

"The Application of Electricity in the Manufacture of Iron." By D. Selby-Bigge, Newcastle-on-Tyne.

"The Probable Existence of a New Carbide of Iron." By E. D. Campbell and M. B. Kennedy, University of Michigan.

"Results obtained in the Equalization of the Varying Temperature of Hot Blast." By L. F. Gjers and J. H. Harrison, Middlesbrough.

"The Compression of Steel in Ingot Molds." By M. Harmet, St. Etienne.

"The Overheating of Mild Steel." By Prof. E. Heyn, Berlin.

"Electrical Plant in Steelworks." By F. Kylberg, Benrath, near Düsseldorf.

The addition to the plant of James Rees & Sons, boiler and engine builders, Pittsburg, is now under roof and the installation of the machinery has already been commenced. The addition is 270 feet long and 80 feet wide.

HANDICAPS OF THE SHOP FOREMAN.

A correspondent of the *Boiler Maker and Sheet Metal Worker* considers under the pen name of "Plates" an item in regard to the dearth of foremen of a certain type. The paragraph in question was to the effect that there is a lack of real good foremen for boiler shops, and that there are firms who would be only too glad to get first class men, men who could earn a salary of at least $200 per month. The correspondent discusses the difficulties that harass many foremen and his account of the handicap under which men in positions of responsibility have struggled will doubtless recall similar instances in shops other than those devoted to the manufacture of boilers. We reproduce the article below:

There are men with the prefix "Foreman" who are good gang bosses only; others again, who are fairly good foremen but have a habit of getting drunk whenever a particularly hard piece of "laying out" is before them. This class soon runs out of all jobs, as the job of trying to drink all the stuff in the city or town is too big a contract. Then there's the foreman who is a good "layer-out" but can't handle men to advantage; and the foreman who wants to do all the laying-out for a big shop—look after the men and a dozen other things—and fights shy at the mention of assistance for fear he will lose *his* job. There's also the foreman who is really a good, first-class workman, but *he will* take a sledge or a hammer and do the work himself, while the gang stand around to see how it's done—and he does it well, too—but, he can't teach "how to do it."

Is the $200 man among these?

I don't really believe he is; and it's an honest opinion after reflection; for there are sober, hard-working men among the foremen pictured here and they earn every dollar they get and work hard for it.

I believe that the man sought for at good figures per month is the one *who can get out the work at lowest shop cost.* I also believe there are some very good foremen in charge of boiler shops today who have all the qualifications necessary to draw $200 per month, who cannot get out the work as low in cost as they should, and the blame *does not* lie with them altogether; but much of the high costs can be justly laid at the door of the office force.

Let us illustrate the handicap a good man sometimes finds himself up against:

(1) There is no order book for him, although office is away from boiler shop; but there are blue-prints of what is wanted made, and the information so scanty that frequent trips to main office are necessary to get data.

(2) Material is all ordered by main office, and upon its arrival in car lots the plates have no job number, and, the shop foreman, having no information in advance, cannot separate it right. The blue-prints have all the materials on them, but they fail to indicate what pieces are expected to be got out of *shop* stock.

(3) Outside work may be taken by office, requiring men to be sent to erect, and no information is given to shop foreman as to how many men are wanted or when they will be needed.

(4) Perhaps the office manager, knowing Billy or Dickey of the boiler shop longer than the new foreman, thinks it all right to send for one of them to come into main office and get instructions, and also incidentally to ask him how many of his chums Billy or Dickey may like to have go.

(5) The estimator makes all figures on jobs—preferring to be guided by cost of "something like it," rather than consulting the foreman.

(6) Plate work is taken which is entirely too heavy for machines; plates ordered from mill too wide or too long for shop; and all are dumped on the boiler shop foreman and he is expected to get out the jobs, or, get out himself. All this could happen in a contract boiler shop.

The above picture may seem to some readers overdrawn, but unfortunately a good bit of it is true—"and pity 'tis 'tis true." I do earnestly believe that this commercial age demands *results,* and if dividends be not shown a change is insisted upon. The management at office could complain that it was all the fault of the foreman; while, as a matter of fact, the office management are as much to blame. In fact, they are altogether to blame if they refuse to co-operate with the shop foreman in applying the remedy.

Of course it is plain that no man of "get-up" in him would run a shop long under such conditions, and no one could blame such a company operating its shop in such a style for wondering where they could get a real good man, "one who could earn $200 per month or more preferred." But, dear reader, if you are a good man would *you* want it at that price, conditions to remain as indicated above?

Nevertheless, it's the man who can *get out work* at lowest shop cost that is earnestly sought for. That firms are willing to pay such a man a good price must be accepted as a business fact, for it is a plain business proposition. It is output at lowest cost that counts; and the matter of a couple of hundred more per year to a good man is a good business investment. But to get results, there must be shoulder-to-shoulder co-operation between main office and boiler shop office. If you *will* judge the boiler shop foreman by his cost sheets, take great care to see that the estimator knows what he is figuring on; for some innocent-looking drawings sent in for estimate are deceiving, and if an estimator gets the labor cost too low and keeps his figures secret from the shop foreman, he must bear the blame for what is clearly his own error.

As a matter of fact, the average boiler shop foreman "has troubles of his own." Men under him will make mistakes, from the layer-out to the car-loader. And these mistakes are more likely to happen in a contract boiler shop than elsewhere owing to the variety of work taken, and the consequent hurry occasioned by time contracts, labor troubles, and the after results of payday. If outside work be taken the erectors sent out are sure to exaggerate the smallest trouble in the fitting of plates as a sort of offset to the "punching up" received from the office.

These troubles every man of experience provides against as near as he can; and he has his hands full when poor machinery and cramped facilities are added to a full order book and slow delivery of plates from mill.

It can readily be seen that a studied method of keeping the foreman off at arm's length regarding orders, estimates and shop policy is far from being conducive to low shop costs. And it is not necessary to give up the business secrets of the firm to bring about a better understanding between office and shop management. The boiler shop foreman should know exactly the estimated labor bill on every job he is expected to get out. If it's necessary to give him a fictitious labor bill for the sake of getting him to hustle, he isn't the man for the place; for when he does "catch on" to the little game he won't believe the truth when he is told it. I believe the "getter-out-of-work" is the $200 man and I believe he will not be able to earn it unless the office co-operates with him from order book to loading list.

The J. A. Fay & Egan Co. and the Lane & Bodley Co., of Cincinnati, are planning the erection of a building upon the site of their Bond Hill factories for the benefit of the workmen. It is intended that the project shall be in the nature of a combined boarding house and restaurant and the purpose is to so conduct it that it will take the place of the usual saloons and lodging houses which spring up in the neighborhood of large manufacturing establishments. The companies expect to derive a benefit in securing a supply of labor of the class which patronizes boarding houses by offering attractive rooms and meals at a much less cost than the workmen could otherwise secure.

Bertsch & Co., manufacturers of shears, punches and bending rolls at Cambridge City, Indiana, have several propositions under consideration to move their plant elsewhere. However, nothing definite has been done as yet, and they are still open to receive propositions from any good towns that can offer liberal inducements. Their present plant has become wholly inadequate to accommodate their growing business, and as they are cramped for room and have no switching facilities, they are obliged to look elsewhere for a location. They established their business 20 years ago and have been very prosperous.

The American Frog & Switch Co., Hamilton, O., has increased its capital from $125,000 to $200,000.

A TALE OF WASTE.

The London *Ironmonger* submits in a recent issue a grim tale of waste in connection with the brass furnaces at the ordnance works at Woolwich, England. It is asserted that the yearly yield of metal from the ashes is worth in the neighborhood of $50,000 and that for many years the property has been thrown on the highways for the repair of the roads. The investigating committee mourns a loss well over a million dollars in the aggregate, and is of opinion that none but properly trained civilian managers should act as superintendents of these factories. This is a fair conclusion to reach as the well trained manager may be able not only to utilize a good share of what now goes to waste but may furthermore be able to prevent the making of many of the "scraps and splashes" that are now such an expensive item. Nothing is said about the volume of brass work done but the amount of scrap is probably not a fair criterion of the business accomplished at the ordnance works.

Some months ago we called attention to the fact that the Woolwich authorities, after using the ashes from their brass foundry and rolling mills for many years to stop holes in the roads, and afterwards selling them to a contractor for 3s, 4d. per ton, had stumbled upon the discovery that the material which they had treated as so much rubbish was worth many thousands of pounds. After a few questions iu the House of Commons the matter seemed to be sinking down comfortably into that vast mud-pool of official blunderings whose surface is rippled now and again by the revelation of some particularly gross War Office scandal or departmental folly, but which no one has the courage or strength to clear away. Fortunately the subject has been rescued from oblivion by the publication, as a Parliamentary paper, of a report of the House of Commons Public Accounts' Committee, and we therefore place the full facts of the case upon record in hope that the subject will not be allowed to rest until the guilty parties have been dealt with as they deserve.

The matter is quite simple. Vast quantities of ashes are produced in the course of manufacturing operations at the Woolwich Ordnance Works, and are accounted for in the stores' returns of the Royal Laboratory. For years these ashes were used for the purpose of repairing the roads about the Arsenal. In 1899 it appears to have dawned upon someone possessed of more intelligence than has been displayed by the staff of the Royal Laboratory generally that the ashes might contain brass which it would pay to recover. The matter was brought to the notice of the Superintendent of the Royal Carriage Department, who reported that "he could not say whether the stuff could be disposed of for any money value. He knew of no one likely to want it, and it would only be used for filling up hollows." The nation presumably maintains one or more chemists at the Royal Laboratory; but it neither seems to have occurred to those gentlemen to analyze a sample of the ashes, nor does the Superintendent of the Carriage Department seem to have thought it worth while to make inquiries in the usual trade quarters as to the value of brass foundry ashes. The material, therefore, continued to be put to the uses considered appropriate to the clay of Imperial Cæsar. In 1900, when the South African war raged, Woolwich was abnormally busy, and the output of foundry ashes grew so as to become a nuisance. Then appeared a kindly contractor, who offered to cart away the brass furnace firehole ashes, and to pay 3s. 4d. a ton for them into the bargain. The grateful authorities accepted the offer "for a period of six months," and then, for the first time, the ashes began to figure in the accounts as an asset. What the contractor did with the stuff is not recorded, but he probably knew more about foundry ashes than the Woolwich superintendents and chemists, and we may assume that he was not out of pocket on the transaction.

The scene now shifts to the Arcadian neighborhood of Woolwich Marshes, where the police keep a weather eye upon marine store dealers. "Towards the end of the year 1900," we are told, "the police reported that scraps and splashes of metal were being picked up by some building contractors' men in the marshes, and sold to marine store dealers in the neighborhood. A sample of these ashes was put up for sale, realizing 6l. per ton.

This was a revelation. The ashes had literally risen, Phœnix-like, from nothing to 3s. 4d. and from 3s. 4d. to 120s. The "scraps and splashes" which had eluded the notice of the Woolwich officials, although they were visible to the naked eye of policemen, marine store dealers, and contractors' men, could no longer be ignored. "Tenders were at once invited for the purchase of the ashes" (observe the suggestion of vigilant watchfulness conveyed in the words "at once"), and the identical contractor who had been carting the stuff away for 3s. 4d. serenely bid from 5l. 17s. 6d. to 6l. 2s. 6d. per ton for an ash-mound estimated to weigh 780 tons.

The 780 tons yielded a revenue of about 4,700l. Later on even higher prices—from 6l. 7s. 6d. up to 7l. 7s. 6d.— were obtained, and the ashes which the superintendent of the Carriage Department neglected are now become a cornerstone of revenue, estimated to be worth 10,000l. a year on an average. Still the matter might have quietly subsided had it not been that the Woolwich accounts must pass the scrutiny of a comptroller and auditor-general, and of a House of Commons Public Accounts' Committee. The comptroller wanted to know why the revenue of the Stores' Department had suddenly grown so remarkably. He reported the result of his inquiries to the committee. The committee now expresses the view that "an absolutely inexcusable waste" of a valuable material such as brass has been going on for many years, and that the total loss is possibly 250,000l. "This heavy and constant waste," it is reported, "has occurred through the want of practical knowledge and training on the part of those occupying the chief positions of authority in the several manufacturing establishments which comprise the Royal Arsenal. The committee is of opinion that none but properly trained civilian managers should act as superintendents of these factories."

It is a melancholy story. Wherever the doings of the War Office are subjected to inquiry we meet with almost incredible ineptitude. In the Woolwich case there seems to be no evidence of anything worse than incompetence on the part of those responsible; but what humiliation is not involved in the statement that those who hold the chief positions of authority in the manufacturing departments of Britain's greatest arsenal are men "wanting in practical knowledge and training"?

The Horseshoe Mining Co. has awarded to the Allis-Chalmers Co. the contract for building the new cyanide mill at the Horseshoe mines, near Lead City, in the Black Hills. There were five bidders, and the proposition of the Allis-Chalmers Co. was accepted by the Horseshoe directors. The contract calls for the completion of the mill in 5 months from date. This mill will have a capacity for treating 1,000 tons of ore daily, and will be the largest complete cyanide plant in the world.

Mr. A. Tait, assistant manager of the works of Messrs. George Angus & Co., Ltd., New Castle-on-Tyne, England, one of the largest leather manufacturers of the United Kingdom, recently spent two weeks in Syracuse, N. Y., having come to this country especially to visit the works of the New Process Raw Hide Co. An arrangement was made with Messrs. Angus & Co. by T. W. Meachem, president of the rawhide company, during a recent trip abroad, whereby the English concern is to establish a plant in England for the manufacture of rawhide gears and other products under the patents and secret processes of the New Process Raw Hide Co. and using the latter company's trade mark. This plant it is expected will take care of the company's business not only in Great Britain but throughout Europe, Messrs. Angus & Co. having offices in nearly all of the principal cities and therefore being excellently situated to care for this trade. Upon Mr. Tait's return to England he will place orders with American firms for the latest gear making machinery and will proceed at once with the fitting out of the new factory which will be located at New Castle-on-Tyne. Messrs. Angus & Co. have been the agents of the New Process Raw Hide Co. in Great Britain for 8 years and have a well established trade in New Process Noiseless pinions.

The stack of the Detroit Iron Works, Detroit, Mich., which has been idle for some time, is now being overhauled and will probably be placed in operation early in December. The furnace has a daily capacity of 40 tons.

INDUSTRIAL BETTERMENT IN NEW HAVEN.

The Housatonic Mfg. Co., of New Haven, Ct., which manufactures tin plated knives, forks and spoons, has a number of admirable features, intended to contribute to the health and comfort of the employes, in the new plant of the company. Speaking of the question of labor, General Manager Russell recently said:

"It has been our aim to make this factory a model one in every way. This we cannot do without the co-operation of our employes. Believing that pleasant surroundings, ventilation, light and cleanliness are conducive both to a healthy mind and body, we have given special attention in our plans for the new factory to these matters.

"By bettering the conditions of our people in the factory, we hope to help them to better their conditions in their homes. We believe that the 'shop betterments' we have introduced in the factory will help to destroy discontent, create harmony and bring greater results to both employer and employed. The key to business success in these days is a common interest on the part of the employer and employed. Without this there can be no perfect organization, and without organization the best factory methods are frequently ineffective."

Light and ventilation are provided upon a broad scale in this factory. There are three hundred windows each five feet wide and ten feet high. Each window is constructed with three separate sashes, which allows of the window being opened at the top, bottom or in the center, thus giving fine ventilation and a perfect circulation of air. To this generous provision for sunshine is added additional light by painting all the interior walls and the ceilings a soft yellow which not only adds to the brightness of the shops, but is mellow, cheery and soothing to the eyes. This is a decided improvement on the old plan of glaring white. All the machinery, too, is painted the same bright delicate color.

Toilet closets separate for men and women are provided abundantly at convenient places in the factory. Over 100 white porcelain wash bowls are used in the lavatories. Hot and cold running water is supplied. A well equipped laundry will probably be arranged in the factory at a near date, in which the aprons and cuffs used by the girls, and other shop articles will be laundried at the expense of the company.

The company will provide wire lockers or closets, in which to hang bonnets, hats, wraps and coats, also as a receptacle for umbrellas and overshoes. These lockers are made of screen wire, giving free ventilation; rapidly absorbing moisture and drying wet clothing. A locker or apartment is assigned to each employe, to whom a key to the locker is given. The lockers are conveniently placed in every room and department. A well equipped gymnasium will be established in the factory, which can be used both by the men and women at different hours. A reading room and library will also be equipped for the free use of employes.

So far as possible, the women and girls employed will have all arrangements and conveniences for their comfort and welfare separate from the departments in which the men will work. There will be separate entrances to the factory for the women, also separate work and toilet rooms.

Rest rooms, light and well ventilated, with easy couches and chairs will be provided in the factory for the women employes. These rooms will be used especially for women or girls who may be taken ill, or if an accident should occur. They will also be used at the noon lunch hour. Provision for the exit of the working people from the factory in case of fire or accident has been carefully planned. Low stairways, easy of ascent and descent, are placed at each end of the building, also in the center, with wide doors opening level on to the ground. The elevator system is as nearly perfect as possible.

A novel feature in the way of shop betterment provided by the company is a swimming pool for the use of the employes. For insurance purposes and to increase the water supply the company has built a large pool which will hold many thousand gallons of water. Located near the power house, this pool is 60 feet in length by 25 feet in width and is from eight to ten feet deep. It will be used as a bathing and swimming pool for the workers in the factory and will be covered with an ornamental building, adding greatly to the many attractive features of the factory grounds. Bathing rooms will be provided, also baths to be used for washing before the plunge in the pool. Steam will heat the water in winter or whenever necessary. This pool with towels and soap will be free to the men and women on different days.

The factory grounds have a frontage of 750 feet. The factory building is located nearly in the center of the grounds, leaving a space many feet in width on either side. The grounds have been leveled to leave a graceful, sloping terrace about 11 feet high, running the entire length of the square, almost the length of one whole city block.

In the center of the broad lawn facing the railroad is a group or little orchard of apple trees. It is a rare thing to see such an ornament of nature in the grounds surrounding a factory. It is proposed to use this grove of apple trees during the summer as a place in which employes can enjoy their lunch under the trees. In the scheme for beautifying the grounds nothing could be more beautiful than this pretty clump of foilage.

The space on the south side of the factory, 550 feet long and 200 feet wide, will be improved and beautified as a park and will probably be thrown open free to the people in the neighborhood. It is the desire of the company to interest the whole neighborhood in bettering the condition of homes and beautifying yards and grounds.

Shrubbery, flowers, grass and pathways with a sparkling fountain, will make this park a delightful spot.

Capt. A. H. Mattox, formerly editor of *Social Service*, in an article describing the factory says: "The writer has had an opportunity to carefully study many industrial plants in this country and Europe, and nowhere has he found a factory so near a perfect model as this one. That success in the manufacturing world can be accomplished by capital and labor being co-partners, I believe will be successfully demonstrated by this model plant of the Housatonic Mfg. Co."

A New Consolidation.

The American Fork & Hoe Co., with a capital stock of $4,000,000, half preferred and half common, has been organized under the laws of New Jersey. The company has purchased a majority of the plants engaged in manufacturing hand farm tools, the names of the selling companies being withheld from the public for the present. M. B. and H. H. Johnson, of Cleveland, attorneys for the new consolidation, have made a statement to *The Iron Trade Review*, saying:

"The company is organized on an exceptionally conservative basis and of its assets one-half million dollars or more is in cash. The company does its own financing and there will be no offer of its stock to the public. The matter has been under advisement by the different manufacturers for the past year. The rapid advance in the price of steel, which enters largely into the product, as well as the large advance in handles, has made it seem necessary to the manufacturers that in order to maintain prices at their present level without materially advancing same, it would be necessary to largely curtail expenses of management, which is believed can be done better under a single rather than a diversified ownership. It is the intention of those largely interested as stockholders to maintain, so far as possible, a price on the goods which shall pay, under economical management, a fair return on the invested capital; at the same time protect the interests of the farmer in the matter of price against an advance. It is generally conceded and believed that the foreign business, under single ownership, can be very largely increased. The management of the company will be in charge of gentlemen who for years have been identified with and built up the business. The company will start with ample manufacturing facilities, having eleven fully equipped plants and ample capital. The headquarters or general offices of the company will undoubtedly be located in Cleveland."

The Lamb Wire Fence Co., of Adrian, Mich., which was incorporated in 1897, has just increased its capital from $200,000 to $400,000 to make provision for taking care of its rapidly increasing trade. The company contemplates only the erection of storage buildings this year with a considerable addition to its manufacturing capacity in the way of special machinery, which is built entirely in its own shops.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The True Mfg. Co., just formed at Eaton Rapids, Mich., will manufacture the True hay and stock rack. The officers elected were: Allen Crawford, president; Thomas B. True, manager and vice president; John H. Ramsay, secretary; J. W. Sheldon, treasurer.

The Webendorfer Machine Co., principal office Paterson, N. J., has been incorporated with a capital of $50,000 to manufacture tools.

The Pressed Steel Mfg. Co. has been incorporated with a capital of $200,000 to manufacture steel ball bearings. The principal office is at Atco, N. J.

The Forward Tool Co., of Milwaukee, with Chris S. Stein, Charles L. Malischk and Fred Brune as incorporators, has been incorporated with a capital of $10,000.

The Bellefontaine Foundry & Machine Co., Bellefontaine, O., has been incorporated with $50,000 capital stock by W. W. Fisher, James M. Elrite, R. F. Tremain, John E. Welsh and Charles B. Harnell.

The Parkes Machine Co., of New York city, has been incorporated with a capital of $500,000, to manufacture machinery. The directors are Wm. N. Parkes, K. L. McCook, Allan McCulloh, Phoenix Ingraham and A. A. Gulick, of New York city; J. T. Boothroyd, of Newburg, and J. M. Ferry, of Bayonne, N. J.

The Philadelphia Roll & Machine Co., Philadelphia, is about to make some improvements in its power plant and is receiving bids on a boiler and engine.

The Fuller Mfg. Co., Danvers, Mass., has been organized under the laws of Maine, with a capital of $100,000, par value $25, for the purpose of manufacturing wheel hoes, scuffle hoes and weeders, and for the development of patents.

The Farmers' Mfg. Co., of Sebring, Ohio, has been incorporated to manufacture iron and steel and other articles of commerce from wood or metal. Capital, $100,000. Incorporators: William Shechan, Abe Simon, Charles Franks, and John Thomas, all of McKeesport, and George Roberts, of Pittsburg.

The Pittsburg Governor Co., of Pittsburg, Pa., has been incorporated to manufacture iron and steel and other articles of commerce from metals. Capital, $25,000. Incorporators: Alexander MacGruthar, F. W. Ries, Jr., C. C. Wallace, A. F. Ramsey and George Flowers, all of Pittsburg.

The Bridgeport Tube Works, Norristown, Pa., were burned a few days ago. Loss, $10,000; insurance, $4,000.

The Stamford Engine & Machine Co., principal office 76 Montgomery St., Jersey City, N. J., has been incorporated. Objects, manufacture of machinery, etc.; capital, $250,000. Incorporators: Walter M. Lawson, William F. Ellis, Geo. C. Gamwell, Samuel Hale and John V. Bonvier.

Chester R. Baird, Harold L. Chaney and S. N. Noble have incorporated Southern Car Wheel Iron Co., of Tallapoosa, Ga., to operate iron furnace, etc. Capital stock is $100,000.

Kiehl Iron Works, New Orleans, have been incorporated. Capital stock $5,000, by Chas. Kiehl, Floyd W. Morgan and Arthur and Frank C. Duvic.

Geo. W. Doran, A. G. Reed, Jas. R. Davidson and others, of Nashville, Tenn., have incorporated Clinch River Iron Ore Co., with capital stock of $25,000.

A. B. Hooper & Sons Mfg. Co., of Nashville, Tenn., has purchased plant of the Eatwell Mfg. Co., at Chattanooga, and will remove same to Nashville, there to add new machinery and otherwise enlarge the equipment. Capital stock will be $25,000.

The Racine Steel & Iron Co., Racine, Wis., has increased its capital from $50,000 to $125,000.

The Carleton Foundry Co., Ltd., of St. John, N. B., has been incorporated with $6,000 capital for the purpose of operating a foundry. W. G. Haslam, W. J. Irons, E. McLeod, E. Riley, J. J. Gordon, W. E. Scully and H. C. Smith are the incorporators.

The Anderson Machine and Foundry Co., of Anderson, S. C., has been incorporated with $10,000 capital. C. S. Sullivan is president and treasurer, R. E. Lyon, vice president, and R. E. Burris, secretary.

The Mathewson Construction Co., of New York, has been incorporated with $25,000 capital for the purpose of engaging in the manufacture of writing machines. W. R. Garrison, W. B. Mathewson and M. Dryden are the incorporators.

The Clinch River Iron Ore Co., of Anderson County, Tenn., has been incorporated with $25,000 capital. Geo. W. Doran, A. G. Reed, L. C. Hager, J. R. Davidson and C. H. Frazier are the incorporators.

The National Engine Co., of Dayton, O., has been incorporated with $10,000 capital to engage in the manufacture of engines. L. A. Zourns, J. E. Turner, J. A. Ambrose, B. E. Houser and E. Thompson are the incorporators.

The Standard Wire Fence Co. has been incorporated at Hutchinson, Minn., and will locate its plant at Stillwater, Minn. The buildings for the plant have already been secured and the machinery will be purchased shortly.

Deere & Mansur Co., of Moline, Ill., are in the market for the following second-hand tools: Trip hammer, 50 to 75 pounds; alligator shears to cut 2½ inches.

The Southern Brass Mfg. Co., of Baltimore, Md., has been incorporated with $3,000 capital for the purpose of engaging in the manufacture of plumbers' supplies. J. H. Corrigan, J. A. Brandy, J. R. Buckingham, Jr., R. T. Hill and P. J. Brandy are the incorporators.

The Burlington Brass Co., of Burlington, Wis., has been organized for the purpose of engaging in the manufacture of brass goods and brass specialties of all kinds. Ground has already been secured for the erection of a brass foundry and machine shop. G. C. Rush has been elected president, O. O. Storle vice president, John P. Gill secretary and treasurer.

A combination to include all the ax, ax-handle and grindstone factories of the United States and Canada is being promoted in New York to have a capital of $25,000,000. Plans for the incorporation of the new consolidation have already been perfected.

Fires and Accidents:—

The furnace of the National Steel Co., at Sharon, Pa., was badly damaged as the result of an explosion which occurred this week. It is probable that the stack will be out of operation for about four weeks.

The plant of the Portland Iron & Steel Co., Portland, Me., was destroyed by fire last week entailing a loss of $100,000. This plant suffered a heavy loss from fire in 1899 but was rebuilt in 1900.

New Construction:—

A. E. Shorthill & Co. will erect a two-story foundry and machine shop in Marshalltown, Iowa. It will have composition roof, structural and cast iron, electric wiring, ventilators, pulleys and shaftings.

A $15,000 two-story brick building, 50x150, will be erected in Toledo, O., to be used by the Toledo Motor Carriage Co. for a factory.

John Kirkham will build a boiler shop in East St. Louis, Ill., at a cost of $1,400.

The Louisville & Nashville Railroad is about to begin construction of addition buildings for the proposed extension to machine shops at New Decatur, Ala. It is said the plant will be nearly doubled, and complete cars, with exception of wheels, will be manufactured. L. Watt Allen has been appointed superintendent of construction.

Plans are under consideration by the Deming Co., Salem, O., manufacturers of steam pumps, for additions that practically double the present capacity.

The Illinois Central broke ground Monday in South Memphis, Tenn., for the erection of its $500,000 machine and car shops. One hundred men will be put to work and the buildings will be erected as rapidly as possible. According to the contract with the city of Memphis the shops must be completed and ready for operation within six months from the date on which the work begins. The new shops with the roundhouses and yards will occupy several acres. The new machine and car shops will be the largest on the southern lines of the Illinois Central, and will give employment to about 500 men. The total cost of the improvements will exceed $1,000,000.

W. D. Williams has completed plans to build a new foundry and machine works in Fredericksburg, Va., in place of the one destroyed by fire some time ago. It will be much larger than the previous plant.

A $10,000 addition is to be built to the plant of the Topeka Steam Boiler Works, Topeka, Kans. The present building has a frontage of 90 feet and is 140 feet deep and only half its length is two stories high. When the additions are completed the plant will be 140x140 and two stories throughout.

The Stutzman Machine Works, Williamsport, Pa., has been purchased by Calvin Marsch and A. D. Hermance, who will immediately make extensive improvements. A number of large machine tools will be added to the present equipment.

The Illinois Central Railroad is contemplating the erection of a car wheel foundry at Waterloo, Ia.

Bates & Edmonds will erect a machine shop at Lansing, Mich., which will be 200 feet long and 50 feet wide. The company is in the market at present for a large number of machine tools.

The Superior Iron Works, Superior, Wis., is erecting a machine shop 25x50 feet.

The American Sheet Steel Co. will install two additional sets of cold rolls at its Muncie, Ind., plant.

The National Steel Co. is erecting an 80-foot addition to its bar mill at New Castle, Pa. This will afford additional cooling room that has been needed for some time. The work is being done by the American Bridge Co.

Craig Ridgway & Sons, Coatesville, Pa., are erecting a pattern shop, 150 feet in length. A large amount of woodworking machinery will be installed.

P. Carroll will erect a boiler plant at Philadelphia, Pa., three stories high and 56x118 feet in dimensions.
The offices of the company are in the White Bldg., Liberty St.

The Buffalo Foundry Co. has plans for a new plant to be erected at Fillmore Ave and the Belt Line tracks, Buffalo, at a cost of $100,000. The main building will be 146x300 feet.

Plans are being prepared for the remodeling of the machine plant and foundry of the Giddings & Lewis Mfg. Co., Fond du Lac, Wis. New machinery will be installed.

The Angus McLeod Co., Minneapolis, has taken the contract to erect the Wabash Screen Door Co.'s factory in Gurney Park. The plant will cost about $200,000,

The Stirling Co., Chicago, which manufactures water tube safety boilers at its shops at Barberton, O., will soon largley increase the capacity of its plant. The company is not now prepared to give the exact cost of the improvements and their extent.

As a part of a plant for the enlargement of the Baldwin locomotive works, Burnham, Williams & Co. recently purchased five lots of ground facing on Pennsylvania Ave., Philadelphia. The price paid was $82,000. The proposed buildings, which will be 40 feet high, of pressed brick, with steel frame, together with the present buildings, will be used as a finishing and shipping department.

Hill & Woltersdorf, Chicago, have let contracts for a two-story machine shop, 60x130 feet, to be built at Grand Crossing for the John A. Mead Co., of New York, at a cost of $15,000.

A prospectus has been issued of the Safety Bangle Bar & R. R. Supply Co., of Kansas City. The company proposes to make rails and the Elzea angle bar, and will put up a mill at Kansas City that will be up-to-date in every particular. The officers of the company are: Col. E. H. Phelps, president; M. B. Lease, vice president; T. H. Goodwin, secretary; and W. H. Winauts, treasurer. Its capital is $2,500,000.

The Chicago, Milwaukee & St. Paul has completed plans for improvements to its shops at West Milwaukee, to consist of a new powerhouse, and an addition to the machine shop. The power house will be 97 by 100 feet, of brick and steel construction, with concrete and pile foundations, and will furnish power for the entire shop. The equipment will consist of four boilers, of 300 horsepower each, an air compressor with a capacity of 1,200 cubic feet of air, 14 by 26 by 36 inches; a Westinghouse engine, of 160 horsepower, direct connected to a 100-kilowatt generator; two 330-horsepower Corliss engines, each connected to 200-kilowatt generators; a 1,000-gallon fire pump, 600-gallon washout pump, together with Cochrane feed water heater and vacuum oil separators. The present machine shop is 420 by 154 feet, and the extension will be 112 feet in length. It will be two stories in height, of iron construction, faced with brick, and the machines in the entire building will be rearranged with such new ones as are necessary added.

The Pittsburg District:—

M. W. Bush, superintendent of the Gadsden plant of the Alabama Consolidated Coal & Iron Co., Birmingham, Ala., has been in Pittsburg for several days for the purpose of awarding contracts for the erection of a new furnace at Gadsden which will be 85x19 feet.

The Bessemer & Lake Erie Railroad added six heavy freight engines, which are said to be the largest ever built, to its equipment this week. The locomotives will haul steel from the various works of the United States Steel Corporation in this district to the lake ports and on the return haul will bring down ore.

The Redding Engineering Co., with offices in the Schmidt Building, Pittsburg, has plans prepared for doubling the size of its Second Ave. plant.

Officials of the Homestead, Pa., armor plant of the Carnegie Steel Co. are endeavoring to secure another trial of the 320 tons of armor plate rejected by the government some time ago. It is reported that both the effective plates came from the same ingot.

General Industrial Notes:—

Harold P. Davis, of 68 Wall St., New York, will develop brown iron ore mines in Alabama, and is about to install plant.

Allegheny Ore & Iron Co. has purchased Buena Vista iron furnace, Buena Vista, Va., and proposes operating same. Chas. H. Zehnder, 25 Broad St., New York, is president.

The Norfolk & Western Railroad Co. has made contracts for the construction of new lines, double-tracking and other work which will necessitate the expenditure of several millions of dollars. The most important work is the line on Big Sandy River, W. Va., which is being pushed since the coal miners' strike has subsided.

The General Electric Co. is reported to have secured a contract for generators, to be utilized in the electric lighting of Montevideo.

The management of the Rock Island has arranged to add 100 new locomotives to its equipment. The Brooks Co. will construct them, the contract calling for the quickest possible delivery. Within the last 15 months, including this order, the Rock Island has contracted for 300 engines, some of which have already been delivered, and many are almost ready for delivery.

Dissolution proceedings have been instituted at Baltimore, Md., to wind up the affairs of the Shaffer Machine and Mfg. Co., of that place, which was incorporated several years ago with $10,000 capital. The company has assets amounting to $10,000 and no liabilities.

The new rail mill that is under erection at the plant of the Dominion Iron & Steel Co., at Sydney, Nova Scotia, will be completed about the first of next year. When this mill is in operation nearly the entire tonnage of rails, for use by Canadian roads, will be rolled at home, as at present these orders go to German and English mills. The company also has under contemplation the erection of a large plate mill.

The Philadelphia Steel & Iron Co., Frankford, Pa., has purchased the franchise, patents and business of the Ferro-Carbon Castings Co., of the same place and will continue the manufacture of Atlas steel castings. The purchasing company is capitalized at $1,000,000 and large additions to the works just purchased are under contemplation. It is probable that an open-hearth plant will be erected in the near future and many other improvements will be made. The officers of the Philadelphia Steel & Iron Co. are as follows: J. W. Allison, president; A. C. Rex, vice president; G. H. Meldrum, secretary and treasurer.

Notices have been posted in the Anderson, Ind., plant of the American Steel & Wire Co., calling for the resumption of that plant. During the period of idleness considerable new machinery was added, replacing much old machinery which has been in operation since the plant was built.

Blast furnaces Nos. 1 and 2 of the new plant of the Lackawanna Steel Co., at Stony Point, N. Y., are practically completed and it is probable that they will be blown in shortly.

Work on the erection of furnaces 3 and 4 has been commenced but cannot be completed before July of next year. The erection of furnaces 5 and 6 has not yet been commenced, and no time can be set at present for their completion.

Four new heating furnaces are being erected at the plant of the Eastern Steel Co., Pottsville, Pa., in the 12 and 19-inch mill departments. Other departments of the plant are being practically rebuilt although repairs in the foundry are nearly completed and operations will be resumed shortly.

The Nova Scotia Steel and Coal Co., of Sydney, N. S., has decided to issue $1,910,000 additional common stock, $1,030,000 of which will be offered at once to the holders of common stock of record on August 20. In a circular to the stockholders, President John F. Stairs says that the business of the company has been most satisfactory since the issue of bonds last year, that the present demand for steel and coal exceeds the present capacity of the works, and that the company is suffering on account of its inability to meet this demand. The board of directors has decided to greatly increase the output of the steel plant, open additional coal property and erect additional coking plants. It is estimated that these improvements will cost $1,850,000, and it is proposed to raise funds for these improvements by this issue of common stock. The balance of the common stock, amounting to $800,000, will remain in the treasury until July 1, 1903.

The plant of the South Bend Brass & Bronze Co., South Bend, Ind., has been purchased by Joseph Bergan & Co. and will be operated as heretofore.

Control of the Susquehanna Iron & Steel Co., Columbia, Pa., was retained by ex-Senator Charles A. Porter and his associates at the yearly meeting recently. The minority interests succeeded only in expressing protests against the Porter management and electing two members of the board of directors. W. H. Butler, who was allied with the opposition, was elected a minority director against John Q. Denney, who led the fight against ex-Senator Porter. The directors of the Porter faction who were elected were Charles A. Porter, H. F. Bruner, Dr. L. S. Filbert, J. W. Steacy, Percy M. Chandler, W. S. Kimball and Henry Clay. The minority interests elected W. S. Butler and R. T. Houston. Ex-Senator Porter was re-elected president, H. F. Bruner vice president, R. G. Filbert secretary and J. W. Steacy general manager.

The American Car & Foundry Co., of Philadelphia, has received a contract to build six car floats for the Pennsylvania Railroad. They will each be 250 feet long and 33 feet beam, the largest ever built in Philadelphia.

All the assets of the bankrupt Wisconsin Foundry & Manufacturing Co., of Racine, have been sold for $1,123.60, according to a report made to D. Lloyd Jones, referee in bankruptcy.

The Rosena furnace of the National Steel Co., at New Castle, Pa., one of the largest in the Shenango Valley, has closed down for repairs, to cost about $50,000. It will probably be three months before it goes into blast.

Considerable progress is being made in the erection of the new plant of the Pennsylvania Silica Brick & Mfg. Co., at Latrobe, Pa. From present indications the plant will be placed in operation in October. When in full operation the plant will have a daily output of 20,000 high grade silica brick. The company owns and controls one solid vein of high grade ganister rock one and one-half miles long and from 60 to 100 feet in thickness. William G. Humphrey, of Pittsburg, is president; George Alexander, Bridgeville, vice-president; Joseph E. McCabe, Carnegie, Pa., secretary and treasurer.

The contract for building four of the new workshops for the Canadian Pacific at Montreal has been awarded Lessard & Harris of that city, the price being $250,000.

A new scale has been adopted by the tin workers at the Chester, W. Va., plant of the American Tin Plate Co., which increases the limit of output to 11,000 pounds per turn. While the regular scale wages are paid at the plant the men are enabled to make better pay than in the tin plate plants controlled by the Amalgamated Association as the limit of output per turn is fully one ton greater.

The Elwood, Ind., plant of the American Tin Plate Co. has again been shut down although the hot mill department resumed early last week and continued in operation until Saturday night.

The strike at the plant of the New Haven Iron & Steel Co., New Haven, Conn., has been declared off by the Amalgamated Association and the men have returned to work. Shortly after the formation of the Amalgamated lodge at this mill the scale for the ensuing year was presented but not signed and a strike was declared. When the scale was presented several days ago it was signed and all the men have returned to work.

The tin plate mills of the Sharon Steel Co., Sharon, Pa., have again been shut down on account of a lack of orders.

No. 2 jobbing mill at the Ætna-Standard works of the American Sheet Steel Co., Bridgeport, O., has been placed in operation. The mill has been idle since June. Mill No. 1, which is an exact counterpart of No. 2 will be completed shortly and will be placed in operation immediately.

The plant of the Phœnix Iron Works, Trenton, N. J., which was purchased recently by William J. Lee, has again been placed in operation.

The men employed on the eight-inch guide mill at the upper plant of the American Steel Hoop Co., Youngstown, O., are anxious to have a new scale to govern the mill formulated by the officials of the Amalgamated Association and the company. The mill and the furnaces have been greatly improved and it is to cover these improvements that a new scale is desired.

The foundry operated by the Philadelphia & Reading Coal & Iron Co., at Pottsville, Pa., resumed last week after an extended period of idleness.

The Catoctin furnace property, located at Frederick, Md., has been ordered sold at mortgagee sale on Sept. 10. The sale of this furnace will end a legal battle which has been waged for the past three or four years during which period the furnace has been out of blast the greater portion of the time.

The Philadelphia Pneumatic Tool Co. will increase its capital stock to $2,000,000 in order to take care of its rapidly growing business and to extend its foreign trade. The company reports an unprecedented rush of business and its manufacturing capacity is taxed to the utmost, running night and day to keep up with orders. The increasing demand for the Keller rotary drill is a particularly noticeable feature in this company's business. Four of the large Eastern steel companies have recently purchased Keller tools to the aggregate number of 237. One of the Western trunk line railroads has made a contract with the company to purchase at least 1,500 Keller tools within the next eight months. A cable order for Keller tools was received last week from Bilbao, amounting to several thousand dollars.

The plate mill department of the Birmingham Rolling Mills, Birmingham, Ala., which was closed for repairs for six weeks, resumed operations this week. The plant is operated by the Republic Iron & Steel Co.

At a meeting of the stockholders of the Central Illinois Malleable Iron Co., of Decatur, Ill., held last week officers were elected as follows: Charles M. Hurst, president; W. M. Bering, vice president; G. A. Hackett, secretary and treasurer. The officers, together with Samuel E. Pratleer and J. Bogardus compose the board of directors.

The first cast of steel was made at the new plant of the Youngstown Steel Casting Co., Youngstown, O., last week. The foundry is modern in every particular and owing to its proximity to the Bessemer plant of the Republic Iron & Steel Co., many of the castings required by this company will be cast in the new foundry.

The old Mary Pratt blast furnace belonging to the Alabama Consolidated Coal & Iron Co. and located in the Birmingham, Ala., district, is being dismantled and part of the machinery is being installed in the Gadsden furnaces of the company.

Deeds conveying the Grubb interests in the Cornwall ore mines located in Eastern Pennsylvania, to the Pennsylvania Steel Co., were filed at Lebanon, Pa. The Grubb interests sold for $1,200,000 and at this rate the entire Cornwall ore property is valued at $14,400,000.

The Weimer Machine Works Co., of Lebanon, Pa., has instituted a suit in equity against M. H. Treadwell & Co. and certain of its officers, in the United States Circuit Court at Scranton, Pa., to enjoin them from infringing on the Weimer patent No. 353,009, covering the Weimer cinder car, and asking for an account of damages and profits.

The machine shops, pattern shops and roundhouse which are to be built by the Union Pacific R. R. at Omaha, will cost $85,000.

Cochrane Receiver Separators

For High Pressure Engines.

BECAUSE of the greater expansive force that can be obtained from high pressure steam, much higher pressures are now carried in steam plants than formerly. By designing engines with large steam ports and valve openings, effort is made to reduce the drop in pressure, as the steam passes from the supply pipe to the engine cylinder.

It is equally important that the full boiler pressure be realized at the throttle valve, and there is no better way of compensating for the loss in pressure due to passing the steam through long lines of pipes than by placing a Cochrane Receiver Separator right next to the throttle valve, or in the horizontal run of pipe as close to the engine as convenient, thereby providing a large steam reservoir, under full boiler pressure, from which the engine can take its supply.

A long steam pipe even though of large size, will not give the same results as a Receiver, because the flow of steam has to be stored in the pipe every time the engine takes steam through such a pipe—this means a loss.

The cost will not be very much, and the increase in engine economy amounts to no trivial quantity. Besides, these COCHRANE RECEIVER SEPARATORS will prevent accidents due to water in the steam.

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Clearfield and 17th Sts. PHILADELPHIA, PA.

STILWELL'S FEED WATER HEATER

USES EXHAUST STEAM TO HEAT AND PURIFY THE WATER FOR YOUR BOILER.

ITS USE INSURES CLEAN BOILERS, GREATER EFFICIENCY AND SMALLER FUEL BILLS.

IF INTERESTED, WRITE

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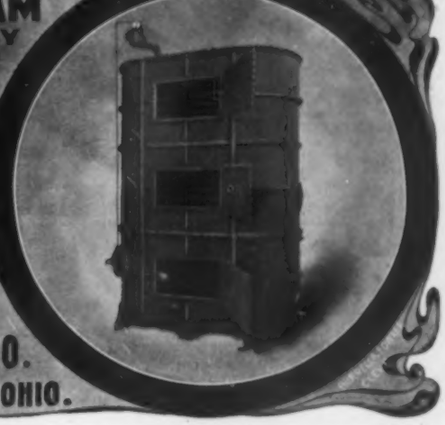

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Galvanized and Black Sheets

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SHEET METAL STAMPING

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ALL WIDTHS, GAUGES AND TEMPERS

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BRIGHT, TINNED AND COPPERED MARKET WIRE.

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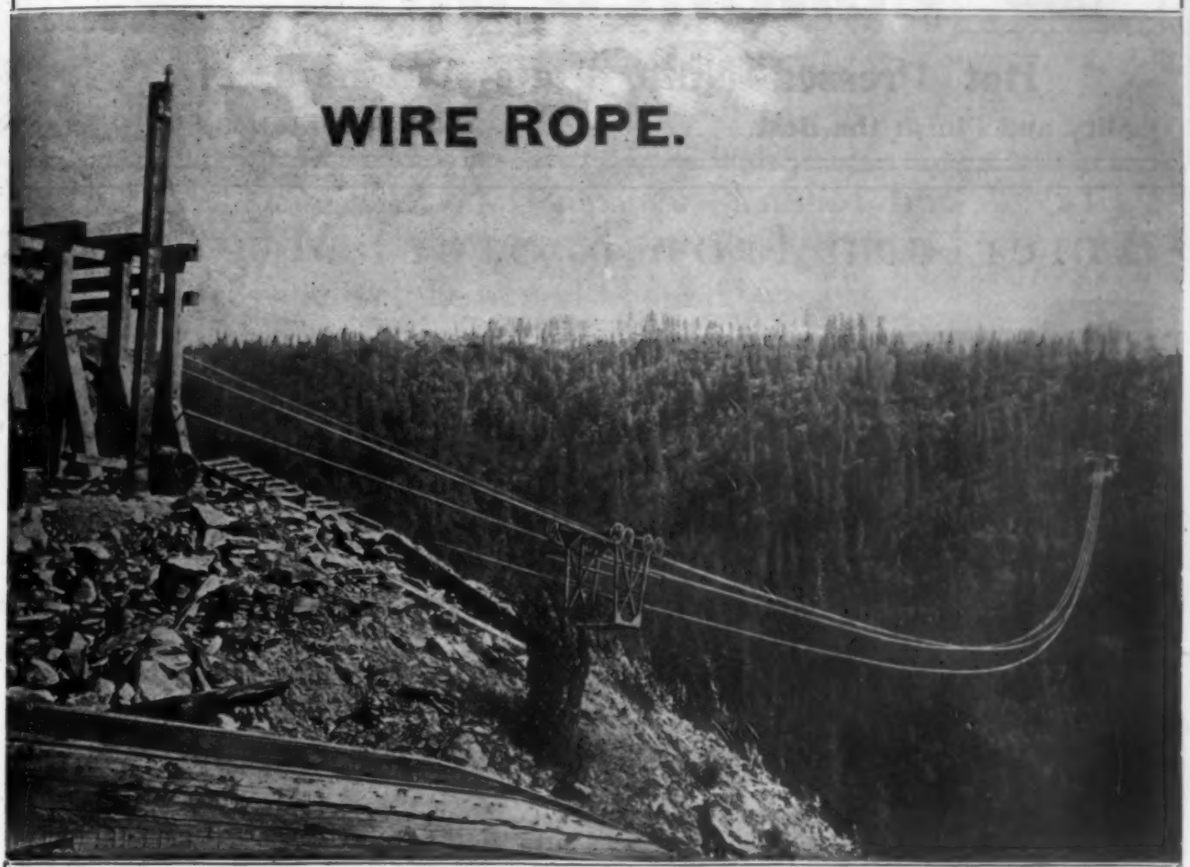

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NAILS, STAPLES, SPIKES and TACKS. Standard Wire Nails in all sizes and shapes. Miscellaneous Fine Nails. Tacks in count and weight packages. Dowel Pins.

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POULTRY NETTING, galvanized before weaving. All meshes and sizes.

HORSE SHOES, "Juniata" brand, iron or steel, in all sizes and patterns. Toe Calks.

COLD DRAWN STEEL, SHAFTING, Free Cutting Screw Steel. Roller Bearing Rods, Rounds, Squares, Hexagons, Flats and Special Shapes.

PLATES AND SHEETS of Bessemer and Open Hearth Steel.

THE MILTON MANUFACTURING CO.,

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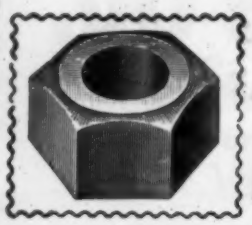

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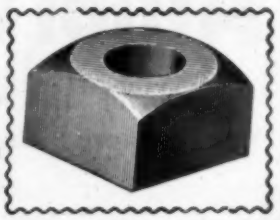

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Quality and Finish the Best. **Send Specifications for Prices.**

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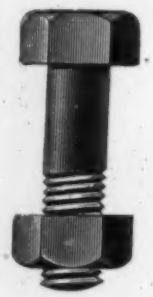

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Also Every Variety of

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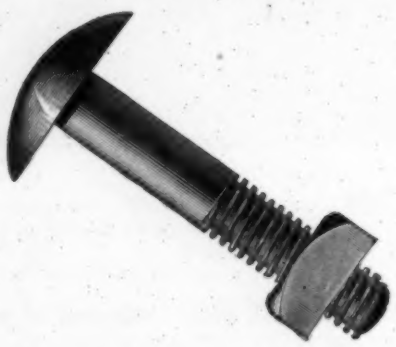

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Ear Bolts with Square or Oval Nuts.
Center Bolts and Shackle Bolts.
Write for Samples and Prices.

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Manufacturers of all varieties of

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DOES IT PAY to use coated sheets in place of black?

IT DOES if you use the ALUMINUM COATED.

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It can be soldered with common solder.

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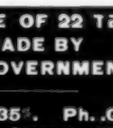

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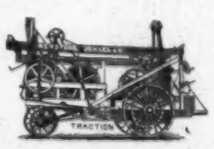

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For All Possible Purposes.
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PRODUCERS OF

Connellsville Coke Only.

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For Blast Furnaces and Foundries; also crushed Connellsville Coke (substitute for Anthracite Coal) for manufacturing and domestic purposes.

13,500 OVENS.

Daily Capacity 30,000 tons of Coke.

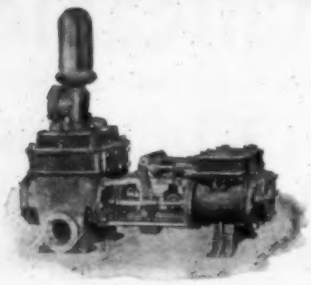
Mines and Ovens in the Connellsville Coke Region, Pennsylvania.

Direct connection with all the railroads entering the region.

Quotations, Freight Rates, Pamphlets giving full information promptly furnished on application.

THE PORTSMOUTH & KENTUCKY FIRE BRICK CO. PORTSMOUTH, OHIO
HIGH GRADE
FIRE
BRICK
BEST BLAST FURNACE & STEEL WORKS BRICK

FOR PUMPING OUT MINES, QUARRIES, EXCAVATIONS,



or for getting rid of dirty water anywhere, which would ruin the ordinary steam pump, use the **Blakeslee Jet Pump.** It will work when other forms of pumping machinery are absolutely useless. There are no valves or other complicated parts to wear out in the **Blakeslee,** and as long as you have steam in your boiler you are ready for business.

Be sure the words **"Blakeslee Jet"** are on the pump you buy for rough service, otherwise you will not have the genuine. :: ::

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SET, CAP and MACHINE
Hexagon Nuts, Studs, Etc. **SCREWS.** Coupling Bolts Specials.
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"THE NUT THAT STAYS"

The Elastic Self-Locking Steel Nut

It goes on the bolt with a slight grip that holds it from ever working loose like the ordinary nut, and requires no nut-lock or other fastening to hold it. For use on Cars, Track, Bridges, Machinery, etc., where nuts must stay it is greatly superior to the common iron nut and costs less. Our Elastic Nut Track Bolt makes the best and cheapest rail fastening. Write us for booklet, samples and prices on Sq. and Hex. Nuts, Machine Bolts, Track Bolts, Structural Rivets, etc. Address

NATIONAL ELASTIC NUT CO., Milwaukee, Wis.

PERFORATED PLATE SCREENS
AS REQUIRED FOR
Stone, Ore, Zinc, Lead, and all Railroad and Mining Uses.
SPECIAL SCREENS FOR COAL AND COKE.
HENDRICK MFG. CO.,
Samples and information upon request. Carbondale, Pa.

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Allis-Chalmers Co.,
CHICAGO.

Perforated Plates

for Incline Shaking and Revolving Screens for Coal Washing and Cleaning, and all other purposes.

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The magnificent through train service maintained by the

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includes Buffet-Parlor, Cafe-Library, Dining and Observation Cars, and Pullman Sleepers. Reduced rate tickets are now on sale to

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Has just been opened. Is now fire-proof. Has been entirely rebuilt of brick, stone and iron.

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ESTABLISHED 1855

The "ORIGINAL GANDY"
STITCHED COTTON DUCK BELTING,

Especially adapted for Main Drivers, Saw Mills, Cotton Gins, Cotton Presses, and for all places where belts are subjected to moisture or atmospheric changes, the "GANDY" stands paramount.
For further information, prices, etc., write
THE GANDY BELTING CO., Baltimore, Md.

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Some machine tool builders do a great deal of advertising through the mails—circulars, booklets, etc.

They spend a lot of time and money getting up attractive printed matter—then what do they do with it? Do they scatter it in the shops, send it to workmen, apprentices, etc., etc.?

Not much—they mail it to the firm, or better still, to the man who is responsible for results in that firm (if they know who he is). To further insure this, they pay letter postage rates.

This is true of circular advertising. Then why should it not apply to trade paper advertising? The man of business who thinks, plans, and buys, naturally reads the paper that assists him in his work. He is interested in questions of management, economical production and matters regarding marketing his product.

He doesn't read papers that are merely mechanical text books, for these papers appeal to the man in the shop, apprentices, etc.

SURELY THIS IS PLAIN, CLEAR LOGIC

The monthly machinery issues of THE IRON TRADE REVIEW are read by the proprietor, manager and mechanical engineer. These *are* the responsible men of the business. They do the buying.

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Are you willing to be convinced?

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The four expert commissioners appointed by the British Iron Trade Association to visit the United States and investigate the causes of this country's preëminence in the manufacture of iron and steel have made their report. By arrangement with the British Iron Trade Association

THE IRON TRADE REVIEW

has the report for sale. It is a *splendid octavo volume of 590 pages*, well printed and thoroughly illustrated, and is probably the

Most complete and valuable commentary on the iron and steel works of the United States

ever published.

The British commission was given access to very full data in every line it investigated, and the report gives an impressive picture of our greatest industry. Iron mining, blast furnace, steel works and rolling mill practice, and to some extent that of important collateral industries, foundries and engineering works, are described with much thoroughness.

Costs, labor conditions, sources of raw material, transportation facilities, economies in works equipment and management, are presented at great length.

159 Illustrations, many of them full-page, of Blast Furnaces, Iron Mines, Steel Works and Rolling Mill Equipment, Ore Handling Machinery, etc., with details of typical latter-day plants.

We shall be glad to have your order for this volume, which is in a sense an Encyclopedia of the American Iron and Steel Industry. The price is £2 or $10.

THE IRON TRADE REVIEW,
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The 1902 Edition of the

DIRECTORY OF THE IRON AND STEEL WORKS OF THE UNITED STATES.

The American Iron and Steel Association has completed a thorough revision of its well-known Directory.

The work of revision has been complicated by the succession of changes in the iron industry that have followed so rapidly in the past three years.

The New Directory contains about 50 pages more than its predecessor of 1898, and is a cloth-bound volume of nearly 450 well printed pages.

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Then follow 164 pages giving a complete description of all the iron and steel works not in consolidations. These are arranged by states.

Part 3 gives a classification by states of the iron and steel works of the United States, except blast furnaces, according to their products—Bessemer, Open-Hearth, and Crucible Steel Works, Steel Casting Works, Rail Mills, Structural Mills, Plate, Sheet and Skelp Mills, Tin Plate Works, Cut Nail and Wire Nail Works, Wire Rod Mills.

This Directory will be found invaluable to all concerns having business with iron and steel manufacturers in any line. The price is $10, postpaid.

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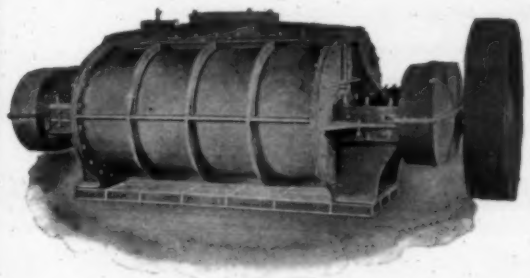
ABSOLUTELY NO COMPARISON

A prominent foundryman gives his opinion of the CYCLOIDAL BLOWER as follows:



"There is absolutely no comparison between the CYCLOIDAL BLOWER and the Fan Blower. Since we installed a CYCLOIDAL we have been able to melt more iron in a great deal less time and with less power than formerly. We have saved considerable on coke and on 'labor for heat' by its use, to say nothing of other expenses and liability of breakage we experienced with the fan."

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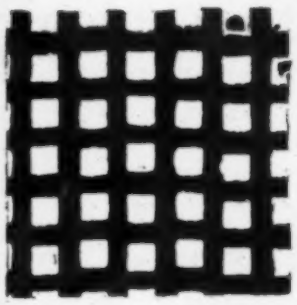

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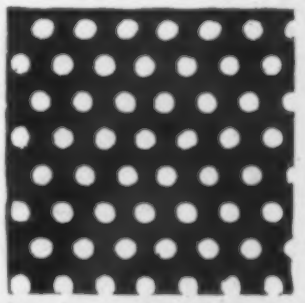

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This is especially valuable for drills, picks and stone cutters' tools, as well as all cutting tools. On taps and shell reamers its effect is particularly noticeable, obviating shrinkage.

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when great tensile strength is required the use of CARBO-MANGAN will show an average gain of 25 per cent. Evaporation slight, Compound good until used, making cost light; full instructions with each order. We guarantee all we claim.

Try a 10-pound sample can, which is sufficient for small test. Booklet on Application.

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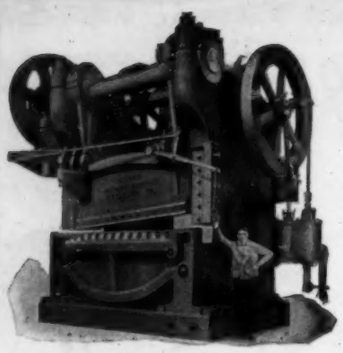

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Corliss Engines, Sand, Chilled
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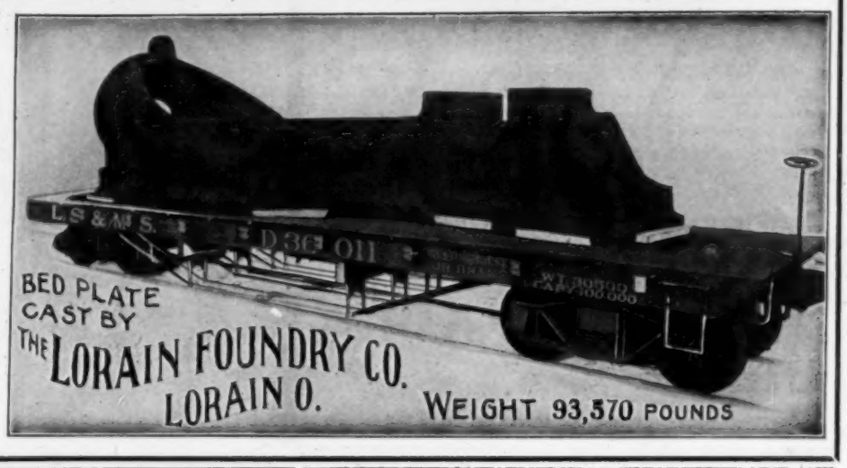

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